APPENDIX A

WET WEATHER OPERATING PLAN
TALLMAN ISLAND WPCP

October 22, 2007

Mr. Robert Elburn, P.E.
Regional Water Engineer
New York State Department of
Environmental Conservation
Division of Water, Region 2
47-40 21st Street - 1st Floor
Long Island City, NY 11101-5407

Re: Tallman Island WPCP, Alley Creek CSO Retention Facility & Flushing Bay CSO Facility
SPDES No. NY0026239
Wet Weather Operating Plan – Response to Questions

Dear Mr. Elburn:

Attached to this letter, please find for your review and consideration a set of responses to your comments from the August 3rd, 2007 correspondence regarding the updated wet weather operating plan (WWOP) for the Tallman Island Water Pollution Control Plant (WPCP), the Alley Creek Combined Sewer Overflow (CSO) Retention Facility and the Flushing Bay CSO Retention Facility. The comments have been individually addressed to provide clarification.

Please keep in mind the consistent level of performance the NYCDEP WPCPs have maintained with respect to our SPDES permits. We stand committed to providing innovative, yet practical approaches to meeting our new wet weather requirements. Part of this commitment also entails updates on changes in process protocols as well as future revisions of the WWOP's in response to post upgrade conditions.

The NYCDEP appreciates your assistance in providing comments to the WWOPs and looks forward to your response. Should you have any questions regarding this submission, please do not hesitate to contact Mr. Allen Deur, P.E., Division Chief of Operations Support at (718) 595-4295.

Very truly yours,

Vincent Sapienza, P.E.
Deputy Commissioner

KC/tn

enc: NYCDEP Response to NYSDEC Comments dated 8/3/07

xc: DEC-Albany: Bureau of Water Permits
J. DiMura

BWT: Greeley, Sapienza, Petito, Quinn, Hammerman, LaGrotta, Massaro, Deur, Cataldo, Pianelli, Giorlandino, Norris
Legal: Eckels

NYCDEP Response to NYS DEC Comments received on 8/3/07

We have received and reviewed DEC's technical comments forwarded to NYCDEP via letter dated August 3rd, 2007 on the Tallman Island Wet Weather Operation Plan, Alley Creek CSO Retention Facility & Flushing Bay CSO Retention Facility. The following attachment individually addresses each point of concern.

TALLMAN ISLAND WPCP

1. *Comment:* *The WWOP contains procedures to be implemented during wet weather, however neither guidance to determine if a wet weather event is imminent, nor a definition of a wet weather event, is provided. Is the WPCP operator required to check the weather to determine if a precipitation event is imminent? What level of flow would be considered a wet weather event?*

   Response: Yes. The operator's general practice is to monitor weather conditions. Wet weather flow is typically any flow that is over the diurnal flow curve.

2. *Comment:* *Page 18-22 of the WWOP guidance discuss the guidelines for wet weather operation and maintenance of the collection system. How was system storage evaluated during development of the WWOP? Is any part of the sewer system flushed after wet weather events to maintain capacity of sewers and regulators chambers? How frequently are emergency generators and automatic transfer switches tested and exercised?*

   Response: System storage was evaluated during the planning phase for the CSO long term control plan. System storage is also managed under the Best Management Practices (BMP) for Combined Sewer Overflows, Section VIII of the SPDES permits. The work related to this BMP is reported to DEC in our BMP Annual Report and it includes a description of our interceptor cleaning program. The sewer system is not regularly flushed because wet weather flows provide the necessary velocities to flush sewer lines.

   The emergency generator is run and tested every week. The auto transfer switch is only on the influent gate actuators and is not tested.

3. *Comment:* *The level of the sludge blanket in the primary settling tanks should be monitored and, if necessary, lowered in preparation for a wet weather event.*

   Response: DEP WPCPs do not carry a primary sludge blanket; therefore, a sludge blanket level is not applicable. Additionally, the Tallman Island WPCP has fixed primary pumps that run at a constant rate. The primary sludge is very dilute, and is degritted via cyclone degritters, which, according to the manufacture's recommendation, need a steady flow for maintaining proper operation. Fluctuations in flow and the resulting variations of velocities, pressures, and centrifugal forces would vary the sieve sizes of grit captured and would potentially impact down-stream equipment.

   Aside from grease removal, flooding of weirs and launders in the primary tanks is not an operational problem during wet weather events. (The performance stays relatively consistent).

4. *Comment:* *The WWOP does not contain procedures for reducing return activated sludge rates during wet weather although the WWOP guidance discusses this option on page 32. Please explain why this option was not considered.*

Response: NYC WPCPs typically operate with sludge blankets in the final tanks that are less than one-foot deep. Tallman Island's return sludge rate is fixed at approximately 30%. RAS rates are typically set by using mass balances. Altering RAS rates in response to every wet weather event would also result in a poor control of wasting accuracy due to the subsequent fluctuations in concentration.

5. *Comment:* *Are there any changes to the rates of polymer addition during wet weather to improve settling?*

Response: Tallman Island does not add polymer in order improve settling. The plant typically meets SPDES permit effluent limits during wet and dry weather conditions without polymer.

6. *Comment:* *No changes are made to the digester or dewatering operations during wet weather. Please evaluate the benefits of reducing the quantity of stored solids in thickeners and digesters prior to wet weather, as discussed on page 40 of the WWOP guidance.*

Response: Typically, sludge treatment is not effected by wet weather flow. Sludge blankets are monitored twice a shift in the thickeners, and sludge pumping is adjusted accordingly. Again, sludge handling maintains a steady operation during wet weather events. There would be no benefit of reducing stored solids in the system prior to a wet weather event.

ALLEY CREEK CSO RETENTION FACILITY

1. *Comment:* *Please include a list of critical equipment in the Alley Creek WWOP.*

Response: The WWOP includes a summary of equipment and systems on page 1-4, 1-5 and the report has been modified. We note that "Critical Equipment" is a defined term in all of the SPDES permits for DEP WPCPs. As set forth in the "Reliability and Engineering Operations" section of each permit, "critical equipment" includes all wastewater treatment equipment required to achieve a minimum of primary treatment and disinfection up to two times the permitted flow. The Alley Creek CSO retention facility does not provide any treatment of wastewater nor is any of the equipment at the facility "required to achieve a minimum of primary treatment and disinfection up to two times the permitted flow," thus none of the equipment at such facility qualifies as critical equipment as that term is defined.

The list of systems / equipment is as follows:

1. CSO Retention Facility (CSORF) Sluice Gate Drainage System – Stage II
2. CSORF conduit flushing System – Stage II
3. CSORF Drainage Control Structure

4. Two (2) Open-Channel Sewage Grinders at Influent to Old Douglaston Pumping Station (ODPS) – Stage II
5. Four (4) Main Sewage Pumps with Pump Control Discharge Cone Valves at ODPS – Stage II
6. Air Treatment System for CSORF and ODPS – Stage II

2. *Comment:* *Please update the WWOP to reflect the completion of construction of Stage 1 and details of the Stage 2 construction currently underway.*

Response: The WWOP will be updated to reflect the outfall and sewer system improvements were completed by December 2006, the new final completion date of June 30, 2008 for Stage 1 and the projected substantial completion date of December 31, 2009 for Stage 2 of the CSO Retention Facility pursuant to the CSO Consent Order milestone.

3. *Comment:* *Section 2-1. The Alley Creek WWOP describes a pumping and cleaning sequence to be initiated after a wet weather event. Please describe the details of operating the pumping and cleaning equipment. Is it manual or automatic?*

Response: The Cleaning Sequence is part of the overall Pumpback Sequence, which is an automatic operation, that is initiated manually by an Operator at the Tallman Island Water Pollution Control Plant (TI-WPCP). Following is a generalized description of the Pumpback and Cleaning sequence.

1. Operator at TI-WPCP manually initiates the stored CSO Pumpback Sequence following a wet weather event.
2. The levels within the CSORF Flushing Water Storage Areas (FWSA's) are automatically checked as part of the Pumpback Sequence. If supplemental flushing (cleaning) water is needed, it is delivered to the respective FWSA through the Flushing Water Feed System, which draws stored CSO from the double barrel outfall sewer above.
3. Once the FWSA's are confirmed to be filled, drainage of the CSORF storage cells to the ODPS commences.
4. Upon completion of the drainage of the CSORF storage cells, and as selected by the Operator, one or more sequences of the CSORF Flushing System are automatically run to wash the bottom of the CSORF storage cells.
5. Upon completion of the CSORF Flushing System Sequence, drainage of the double barrel CSO outfall conduit to the ODPS commences.
6. When the Pumpback Sequence is complete, all equipment is automatically returned to their respective pre-operation positions.

4. *Comment:* *Section 2-2. The items to be found on Figure 1-2 are referenced, but these items do not appear there.*

Response: Attached Figure 1-2 has been updated to include the items referenced in Section 2-2.

5. *Comment:* *How are floatables captured in the facility and how are they collected and disposed of?*

Response: Two (2) means of floatables control are provided as follows:

1. CSORF – Two (2) trash racks are provided, each with 6" clear spacing between the bars. The first rack is located upstream of the sluice gate that drains the CSORF storage cells, and the second is located upstream of the sluice gate that drains the double barrel CSO outfall conduit. The trash racks are provided to protect the sluice gates and downstream pinch valve from damage by any large objects that may be stored within the CSORF. Debris collected behind the trash racks will be removed manually.
2. ODPS – A new underground structure has been added upstream of the wet well for the ODPS, which will house two (2) open-channel sewage grinders. All flow (sanitary & combined) will pass through these grinders prior to entering the wet well and being pumped out to the interceptor system for conveyance to the TI-WPCP.

6. *Comment:* *Please clarify whether operations are manual or automatic. It seems that some of the actions noted in the WWOP are manually operated, which is a concern since the facility is not manned.*

Response: Once initiated, the stored CSO Pumpback Sequence will continue automatically until completion; however, the actual initiation of the Pumpback Sequence is a manual operation that must be started by an operator at the TI-WPCP (See response to Comment No. 3).

7. *Comment:* *How will the available hydraulic capacity of the collection system and the Tallman Island WPCP be monitored so the operator can determine if it is safe to discharge wastewater from the Alley Creek retention facility? Please incorporate this determination into the actions to be taken after a wet weather event.*

Response: Level detection and flow devices are located at the TI-WPCP, and at key locations along the Flushing Interceptor at the following locations:

1. Chamber No. 2 adjacent to the Flushing Bay CSORF
2. Regulator No. 9 at the intersection of Linden Place and 31st Street, Flushing, NY
3. Junction Chamber of the Flushing and Whitestone Interceptors at the intersection of 11th Avenue and 130th Street, College Point, NY

The flow in Chamber No. 2 is measured and monitored so that the carrying capacity of the Flushing Interceptor does not exceed 58 MGD at that point. The flow in Regulator No. 9 is measured and monitored so that the carrying capacity of the Flushing Interceptor does not exceed 65 MGD at that point. In addition, the flow at the TI-WPCP is measured and monitored so that it does not exceed 80 MGD during the Pumpback Sequence. All of the above measuring and monitoring functions are performed automatically.

8. *Comment:* *Please describe how the pump out of the Alley Creek CSO retention facility will be coordinated with sewer system monitoring stations, the operation of the Flushing Bay CSO retention facility, and the operation of the Tallman Island WPCP. Will the Facility Monitoring and Control System at the*

Flushing Bay CSO retention facility also monitor the Alley Creek CSO retention facility?

Response: The Operator at the TI-WPCP will be responsible for monitoring water levels in the critical Regulators and Chambers listed in the response to Comment No. 7. The Operator will also be responsible for initiating the Pumpback Sequence, and will have the override capability of terminating the Pumpback Sequence if it becomes necessary.

Once the Pumpback Sequence for the Alley Creek CSORF is initiated, the CSORF will begin draining, and the ODPS will begin pumping at a constant rate of approximately 8.5 MGD. The level detection system within the TI-WPCP interceptor system will detect this additional flow from the Alley Creek CSORF, and send a signal to the Pumpback System for the Flushing Bay CSORF. This signal will be processed by the Pumpback System's variable frequency drives (VFDs), and the pumpback rate for the Flushing Bay CSORF will be automatically adjusted to insure that none of the preset levels within the key Regulators and Chambers are exceeded.

In addition to the on-site locations at the ODPS and the CSORF, and the two (2) locations at the TI-WPCP, provisions are also being made at the following facilities for monitoring the progress of the Alley Creek CSORF Pumpback Sequence:

1. Avenue V Pumping Station Crew Quarters or potential alternate location once Avenue V Pumping Station is vacated for contruction.
2. Flushing Bay CSO Retention Facility

9. Comment: *Please explain how flow will be calculated (or measured) for purposes of permit monitoring.*

Response: During the first two years that follow final acceptance of Alley Creek Contract ER-AC2; velocity, level, and rainfall data will be collected and used to calibrate a hydraulic model of the tributary combined sewer system and the CSORF. At the end of the two-year monitoring period, the final calibrated hydraulic model, in conjunction with collected rainfall data, will be used to determine the volume of combined sewage that discharges into Alley Creek through new Outfall TI-025 and through existing Outfall TI-008. The equipment to be used for data collection will be installed under Contract ER-AC2; the locations and types of equipment are as follows:

<u>Measurement of CSO Through Outfall TI-025</u>

- Level sensor located overtop of the fixed end weir, at the downstream end of the new double barrel outfall sewer and CSORF.
- Velocity meter located within the limits of the new double barrel outfall sewer, upstream of the fixed end weir.

<u>Measurement of CSO Through Outfall TI-008</u>

- Level sensor located overtop of the emergency overflow relief weir, within Chamber No. 6.

Measurement of Stored Volume within the New Double Barrel Outfall Sewer and CSORF

- Double Barrel Outfall Sewer – Two (2) Level sensors; one located within the northern barrel, and one located within the southern barrel.
- CSO Storage Cells – Two (2) Level sensors; one located within the northern section of the CSORF, and one located within the southern section of the CSORF.

Rainfall Measurement

- Rain gauge located within the secure fenced-in area of the ODPS.

This equipment will all be removed at the completion of the two-year monitoring period, with the exception of: the rain gauge, which provides the input rainfall data for the hydraulic model; and the four (4) level sensors within the new double barrel outfall sewer and CSORF, which provide the data necessary for the calculation of the stored volume of CSO.

FLUSHING BAY CSO RETENTION FACILITY

1. *Comment:* *Appendix B. The Flushing Bay CSO retention facility was entered into the WWOP binder backwards. Please correct*

   Response: This will be corrected.

2. *Comment:* *Page 1 -1. The Flushing Bay WWOP states that the minimum storage capacity is approximately 43.4 million gallons; about 28.4 million gallons in basin storage and about 15 million gallons of in-line storage. However, the Application Form NY-2A Supplement for Regional Treatment Facilities that was submitted to the Department in August 2003 lists the facility design retention volume as 28.4 million gallons. Please complete the enclosed NY-2A supplement with corrected information and submit it with the revised WWOP.*

   Response: The NY-2A application has been revised to reflect capacity of 43.4 MGD. (See attachment)

3. *Comment:* *Please provide a list of critical equipment in the Flushing Bay CSO retention facility WWOP.*

   Response: The WWOP includes a summary list of equipment and systems on page 1-14 and the report has been modified. We note that “Critical Equipment” is a defined term in all of the SPDES permits for DEP WPCPs. As set forth in the “Reliability and Engineering Operations” section of each permit, “critical equipment” includes all wastewater treatment equipment required to achieve a minimum of primary treatment and disinfection up to two times the permitted flow. The Flushing Bay CSO retention facility does not provide any treatment of wastewater nor is any of the equipment at the facility “required to achieve a minimum of primary treatment and disinfection up to two times the permitted flow,” thus none of the equipment at such facility qualifies as critical equipment as that term is defined.

4. *Comment:* *The odor control system should be included on the above list of critical equipment. A section for wet weather operations for the odor control system should be added to the WWOP.*

Response: The air treatment system is included in the summary list of equipment listed on page 1-14 of the WWOP. See also Air Treatment System. The following section will be added to WWOP Section 2.5:

Air Treatment System

1. General Description.

The purpose of the Air Treatment System is to continuously collect and treat odorous air, sewage gases and vapors. Control of odors will provide facility personnel with a safe working environment by removing obnoxious odors and harmful gases from areas where they perform their daily work routines. Odor treatment will also prevent community odor nuisances by reducing odors and gases to a safe, inoffensive state prior to atmosphere discharge.

The Flushing Bay CSO Retention Facility has been provided with a wet scrubber air treatment system to prevent any odors produced in the facility from becoming a nuisance to either workers in the facility, or to the surrounding community. Possible odor sources within the facility include the influent channels, the screening area, the wet well, and the storage cells. The total ventilation required for these areas is approximately 180,000 cubic feet per minute (cfm).

The Air Treatment System is designed to remove 99.9 percent of the incoming hydrogen sulfide in an air stream of 180,000 scfm with a maximum hydrogen sulfide concentration of 10 ppm.

2. Process Description.

The unit process for the treatment of odorous air is known as chemical absorption. In this process, air is washed or "scrubbed" by being brought into contact with a chemical scrubbing solution of water, sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl). This contact is achieved by blowing the air upward through a scrubber vessel filled with a bed of plastic packing media. The chemical scrubbing solution is sprayed into the scrubber above the packing media and flows downward against the air flow in what is known as counter–current flow. The scrubbing solution and air come into contact with each other as they flow in opposite directions, and odor producing substances in the air are absorbed into the liquid stream and removed from the air. The odorous compounds react with the scrubbing solution to create soluble non–odorous compounds. The treated air passes through a demister, and droplets and moisture are removed from the air stream before it is discharged to the atmosphere.

Scrubbing solution that has passed down through the packing bed of a scrubber flows by gravity to a sump at the bottom of the scrubber vessel. The collected scrubbing solution is recycled continuously from the sump back to the top of the scrubber vessel by recirculating pumps. The sump overflows continuously, discharging the products of reaction with the scrubbing chemicals. Over time, as the scrubber solution reacts with contaminants in the air stream, it becomes less reactive and requires the addition of chemicals to restore its strength. NaOH and NaOCl are added to the sump underflow by chemical feed pumps. The addition of NaOH is regulated by a pH control system, and the addition of NaOCl is regulated by an Oxidation Reduction Potential (ORP) control system. The two control systems ensure that the odor removal effectiveness of the scrubbing solution is always at its maximum.

Odorous air is collected from the bar screen influent channels, screenings area, wet well and storage cells. The total ventilation required for these areas is approximately 180,000 cfm.

Fresh air is supplied to the influent channel, screening area, wet well and storage cells. The volume of supply air is six percent less than the exhaust air volume, ensuring negative pressure in the odorous areas.

Four (4) air treatment modules, each rated at 45,000 cfm are provided to treat odorous air. Each scrubber is provided with a blower, and two recirculation pumps. One recirculation pump serves as a standby unit. Sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) are added to the scrubber sump to maintain the pH in the sump between 10 and 13, and maintain a clear solution in the sump. Chemicals feed concentrations are 25 percent NaOH, and 15 percent NaOCl.

NaOH and NaOCl are stored in separate tanks. Three (3) tanks are used to store NaOCl; two (2) tanks are used to store NaOH.

3. System Performance.

The Air Treatment System demonstrates the following performance when operating under design flow conditions listed above.

Air Treatment System Performance

Inlet	**Outlet**
0-10 ppm H_2S 11-50 ppm H_2S	<10 ppb H_2S 99.9% Removal H_2S

5. *Comment:* *Page 1 -7. The Flushing Bay CSO retention facility WWOP states that dry weather infiltration and inflow enters the facility. Please estimate the volume of this flow and describe any impact this may have on maintaining the volume of the facility for CSO capture.*

Response: In the Spring of 1992, URS examined the main lines of Kissena Corridor and Park Drive East Storm Lines via an Internal Walking Inspection. Flow measurements and sampling (BOD, TSS, Fecal Coliform) were conducted. The survey found that there was a total of 484,000 gpd of dry weather flow of which 142,000 gpd were from sanitary connections while the remaining 342,000 were from infiltration. The sanitary connections locations were reported to NYC DEP for enforcement (assume an 8% success rate) and an analysis showed that 25% of the infiltration may be cost effective to remove. Therefore, the estimated future dry weather flow is:

0.20 x 142,000 gpd = 28,400 gpd

0.75 x 342,000 gpd = 256,500 gpd

Therefore, 284,900 gpd (or~200 gpm) dry weather flow is collected through the facility influent channels and is directed to the facility secondary wet well. Two (2) secondary (dry pit submersible type) pumps @ 875 gpm are provided to pump out the dry weather flow from the secondary wet well to the interceptor that discharges to the Tallman Island WPCP. The water surface level in the secondary wet well shall also be monitored to ensure that the secondary wet well is emptied out in a timely fashion and especially before a storm event. This process of emptying the secondary wet well will potentially eliminate any impact on the facility storage capacity. In the future, the actual dry weather flow will be measured and recorded using the flowmeter in the discharge line of the secondary pumps.

6. *Comment:* *Page 1-12. Pumping back the retained wastewater to the treatment plant is described. This section should discuss the reasons that pump back is limited to nighttime hours. Please evaluate how CSO could be pumped back to the wastewater treatment facility more quickly and include information about pump capacity, interceptor limitations, and wastewater treatment plant design flow. Can the CSO from Flushing Bay CSO retention facility be pumped back quicker if only primary treatment and disinfection are provided at the 26th Ward WPCP (DEP NOTES: Reference is to Tallman Island WPCP)?*

Response: The pump-back should not be and is not limited at nighttime. The intent is to pump-back the stored CSO whenever there is available capacity at the Tallman Island WPCP and also in the Flushing Interceptor at Chamber No. 2 and Regulator No. 9.

The stored CSO in the storage cells and in-line is drained to the wet wells and pumped out utilizing four (4) variable speed primary pumps (one as stand-by) of 6,500 – 15,500 gpm capacity each and two (2) secondary pumps (one as stand-by) of 875 gpm each to the chamber No.2 which is located in the Flushing Interceptor that discharges to the Tallman Island WPCP.

The flow in Chamber No. 2 is measured and monitored so that the carrying capacity of the Interceptor does not exceed 58 MGD at that point. The flow at the Regulator No. 9 is also measured and monitored so that the carrying capacity of the Interceptor does not exceed 65 MGD at that point. In addition, the flow at the Tallman Island WPCP is measured and monitored so that it does not exceed 80 MGD during pump-back. All the above flow measuring/monitoring functions and the pump-back are performed automatically.

The stored CSO will be pumped back to the Tallman Island WPCP at a rate so the incoming flow to the plant does not exceed the plant design flow of 80 MGD. The pump-back will be quicker if the capacity at the Tallman Island WPCP is increased beyond 80 MGD by providing only primary treatment and disinfection to the incoming flow, although better overall treatment is accomplished if pump-back is run through full secondary treatment as well.

7. *Comment:* *Page 2-1. It is noted in the Flushing Bay CSO retention facility WWOP that the WWOP was prepared when the facility was under final construction. Now that construction is complete, the WWOP should reflect the current situation.*

Response: As the Facility is operational, we agree to remove the sentence from p. 2-1: "At the time this protocol was being prepared, the Flushing Bay CSO Retention Facility was under final construction, and maybe subject to revisions by the time the Facility is in operation. This protocol will be revised as appropriate when installation of the unit processes is completed"
In addition, the WWOP will be modified to reflect current operational conditions.

8. *Comment:* *Section 2. The Flushing Bay CSO retention facility WWOP is meant to contain "the wet weather operating protocols" that operators of the facility should follow before, during and after wet weather events. However, much of the section describes the design and automatic operations of the facility (see page 2-3, paragraph 3, for example). While it is useful for the operator to be aware of these, the purpose of the WWOP is to provide guidance to operators. Please modify the WWOP so that Section 1 contains information regarding the automatic operations and Section 2 contains operating protocols for before, during, and after an event; triggers for those actions; a section on why the protocol is undertaken; and a section on what could go wrong (and how the operator should deal with it). Please rewrite all sentences that begin with "In case" as they are not clear.*

Response: We recommend that the description of the design and automatic operations of the facility remain a part of this section (Section 2) as it will be easier for the facility operator to understand the design intent.

Sentences that begin with "In case" are replaced as follows:
"If during a storm event, the water level rises in the Bulkhead Chamber and the gates do not open, there is a potential of water backing up in the upstream sewer lines. An alarm is transmitted to the Control Room prompting the operator to open the gates manual."

9. *Comment:* *Section 2-3. Manual operations are discussed. Since the facility is not intended to be manned 24 hours a day, please explain how these manual operations will be performed.*

Response: At the present time, under the construction contract, the facility is manned 24 hours a day. An operating plan will be developed based on the experience gained from the 1-year demonstration by the consultant for operation of the facility during the day shift only.

10. *Comment:* *Page 2-8. Please provide the size of the pumps.*

Response:
1. Primary pumps capacity: 6,500 – 15,500 gpm each
2. Secondary pumps capacity: 875 gpm each

11. *Comment:* *Page 2-21. The Hydroself flushing gate system is described. The filling of the storage reservoir if the floor is not clean and the need for additional flushing is discussed. How will it be determined that the floor is not clean?*

Response: The facility personnel shall physically inspect the storage cells after each storm to assess the number of times the flushing sequence needs to be repeated to achieve satisfactory results. The data from various storm events shall be collected and analyzed to determine an average number of flushing cycles to use after a storm event. This will eliminate the need for inspection after each storm.

12. *Comment:* *Page 2-23, paragraph 2. Please provide more detail regarding the sediment flushing bucket and how or when the valve pump closes. Include a section about what can go wrong.*

Response: Paragraph 2 will be replaced as follows:

"During the rainstorm, the storage cell and buckets are filled with water. When the storage cell is emptied, and the water surface falls below the buckets, the buckets flip and release their water content. In order to refill the buckets and initiate the flushing sequence, water is supplied to the buckets by the SFT flushing water pumps at a rate of 100 gpm. The capacity of each flushing bucket is 1,000 gallons and there are three (3) buckets in storage cell No. 2.

The SFT flushing water pumps discharge to a common header which subsequently divides into three (3) discharge lines that supply water to the flushing buckets. Each discharge line is provided with a motor-operated valve. The flushing sequence is initiated by opening the valve and when the bucket is in the upright position. Water is supplied to one bucket at a time. A flowmeter installed at the common header measures the flow rate and will signal the motor-operated valve to close once the bucket receives 1,000 gallons. The bucket then tips, releasing its water and the flushing cycle is automatically repeated for the second bucket by opening the corresponding valve and finally for the third bucket after the flushing cycle of the second bucket is completed.

What can go wrong?

If the flushing water pump does not work the stand-by pump will start. If the automatic mode is not functioning, the system will be operated in manual or "Alternate" mode. The alternate mode is described in detail in the Flushing Bay CSO O&M manual Chapter VIII, Section B-6. This mode of operation should be used for testing and maintenance. The SFT feed pumps operation is available from the local control station and from the valve local control stations."

13. *Comment:* *Page 2-24 (Chemical Feed and Storage System). A section titled "During Normal Operation" is included. Please explain what normal operation is in the context of the WWOP, include procedures for before, during, and after wet weather events and describe when the chemical feed system is started. (DEP NOTES: Comment refers to page 2-27 not 2-24)*

Response: The addition of chemicals to the scrubbing solution is continuous because the air treatment system operates on a continuous basis therefore the procedures for before, during, and after wet weather events are the same. NaOH and NaOCl are added to the sump underflow by chemical feed pumps. The addition of NaOH is regulated by a pH control system, and the addition of NaOCl is regulated by an Oxidation Reduction Potential (ORP) control system.

14. Comment: Page 2-27. A method of calculating overflow volume and retained volume is defined. This method differs from the hydraulic model required in the permit. However, monitoring is preferred over modeling of permit parameters. Thus, the permit will be modified to reflect the actual measurement methods

Response: The permit will need to be modified to reflect the actual measurement methods.

City of New York
Department of Environmental Protection
Bureau of Wastewater Treatment

Tallman Island
Water Pollution Control Plant
Wet Weather Operating Plan

Prepared by:
The New York City Department of Environmental Protection
Bureau of Wastewater Treatment

October 2007

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1.0 INTRODUCTION

The Nitrogen Administrative Order on Consent, DEC Case # CO2-20010131-7 ("the Order") entered into by the City of New York ("City") and the New York State Department of Environmental Conservation ("DEC") was effective as of April 22, 2002. This Order has been superseded by a Consent Judgment, Index No. 04-402174 (Supreme Court of New York County, Feinman, J.) effective Feb. 1, 2006 (the "Judgment"). Pursuant to Appendix A of the Order: "Upper East River WPCPs Upgrade Schedule and Compliance Deadlines", the City submitted a Wet Weather Operating Plan (WWOP) for the Tallman Island Water Pollution Control Plant (WPCP) July 20, 2003. Pursuant to the Order, the WWOP describes procedures to maximize treatment during wet weather events while the Tallman Island WPCP is under construction. The WWOP specifies procedures for the operation of each unit process to treat maximum flows, without materially diminishing effluent quality or destabilizing treatment upon return to dry weather operation. The WWOP establishes process control procedures and set points to maintain stability and efficiency of the biological nutrient removal (BNR) process. The WWOP specifies the treatment facilities that will be available during the construction period. The WWOP is based on operations of process units that are available during the construction period operated at their peak hydraulic loading rate. The actual process control set points are established by the WWOP. Pursuant to the Judgment, upon completion of construction, the WWOP shall be revised to reflect the operation of the fully upgraded Facility. The revised WWOP for Tallman Island shall be submitted to DEC within 18 months of the completion of the construction at the Facility.

The Tallman Island WPCP WWOP has been prepared by Blasland, Bouck & Lee, Inc./ TAMS Consultants, Inc. (BBL/TAMS) in accordance with the specifications and guidelines provided in the *Specification For Preparing Wet Weather Operating Plans for New York City Wastewater Pollution Control Plants* (HydroQual, Inc., 2002). This WWOP is intended to be a living document and will be revised as required or needed to reflect modifications in operating procedure, construction activities and/or equipment replacements.

Below is a description of the Tallman Island WPCP including the following items:

- Facility background;
- Effluent Permit Limits;
- Performance goals for wet weather events; and
- Purpose of this WWOP
- Using this WWOP
- Revisions to this WWOP

1.1 FACILITY BACKGROUND

The New York City Department of Environmental Protection (NYCDEP) owns and operates the Tallman Island WPCP located in the College Point section of the Borough of Queens. The facility serves a drainage area of approximately 17,100 acres and an estimated population of nearly 400,000 residents in the northeast portion of the Borough of Queens.

The New York City Department of Public Works designed the original Tallman Island WPCP in the early 1930s. The plant began operations in time to treat wastewater from the 1939 World's Fair held at Flushing Meadows Park. The original plant was designed to serve an estimated population of 300,000 people with a wastewater flow of 40 million gallons per day (MGD). Several major expansions and upgrades were completed in 1964 and 1979. The plant now consists of two parallel treatment batteries (East and West) and is designed to treat an average flow of 80 MGD, a peak primary treatment capacity of 160 MGD and a peak secondary treatment capacity of 120 MGD. The capacity of the secondary treatment bypass channel is 68 MGD. The maximum capacity of the interceptors delivering flow to the plant has been estimated at approximately 200 MGD. This estimate may be revised since modeling of the drainage area is currently being performed (by others) to determine the capacity of interceptor to the plant.

During dry weather conditions wastewater is collected by the combined and sanitary sewers and transported by gravity or pump stations through the regulators and interceptors to the plant for treatment and subsequent discharge into the Long Island Sound. During wet weather, storm water runoff combines with the wastewater in the combined collection system, producing an increase in flow. The Tallman Island WPCP is designed, and required by its SPDES permit, to process up to 160 MGD during wet weather, which is twice its design dry weather flow (DDWF). Flow in excess of 160 MGD is discharged through combined sewer outfalls (CSO). The amount of flow discharged through the CSO's is controlled by the regulators and is dependent upon interceptor capacities, WPCP operations and rainfall characteristics (intensity, duration and location).

While the Tallman Island WPCP has a twice design capacity of 160 MGD for wet weather flow, the plant operators can control the amount of flow received by the plant through use of the plant's influent throttling gates. The plant operators use the throttling gates to maintain reliable plant performance during and after a wet weather event. The objective of this Wet Weather Operating Plan is to establish an operating procedure that will maximize treatment of wet weather flows, and if possible, consistently achieve or exceed two times DDWF. The current unit processes include screening, preliminary settling, grit removal, activated sludge treatment (step aeration), final settling and chlorination. Sludge treatment includes gravity thickening, anaerobic digestion, and sludge dewatering with off-site disposal of the dewatered sludge. Figure 1-1 presents aerial view of the Tallman Island WPCP.

1.1.1 Drainage Area

The drainage area tributary to the Tallman Island WPCP is estimated to be approximately 17,100 acres and is generally bounded by Flushing Bay, Nassau County Line, Grand Central Parkway, and the East River. Figure 1-2 presents the plant location, drainage area, and locations of major elements of the collection system.

The total drainage area is divided into three smaller areas served by an interceptor collection system which include:

- Flushing Main Interceptor-Collector (13,300 acres);
- Whitestone Interceptor-Collector (3,300 acres); and
- College Point Interceptor (500 acres).

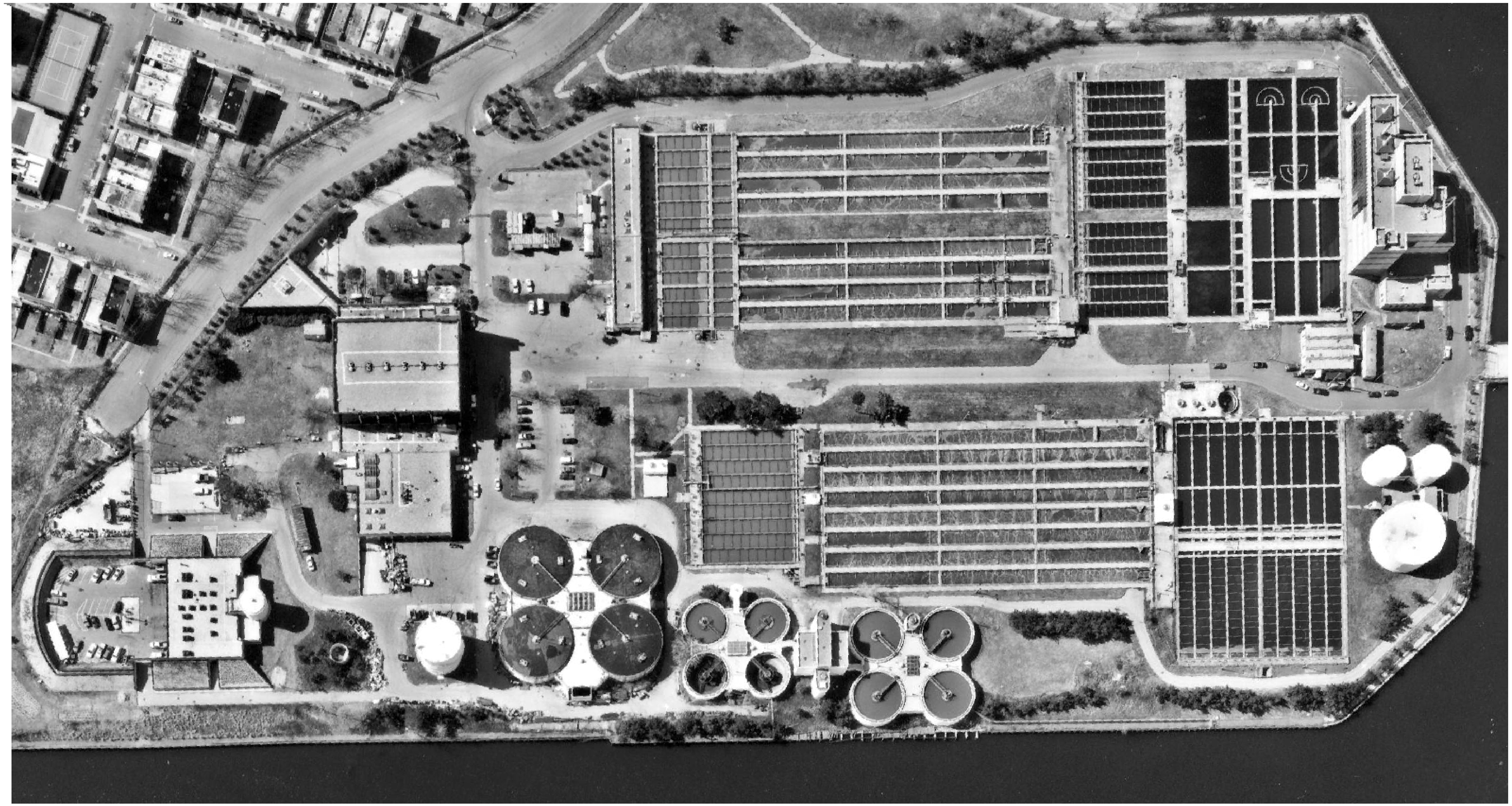

FIGURE 1-1

AERIAL VIEW OF TALLMAN ISLAND WPCP

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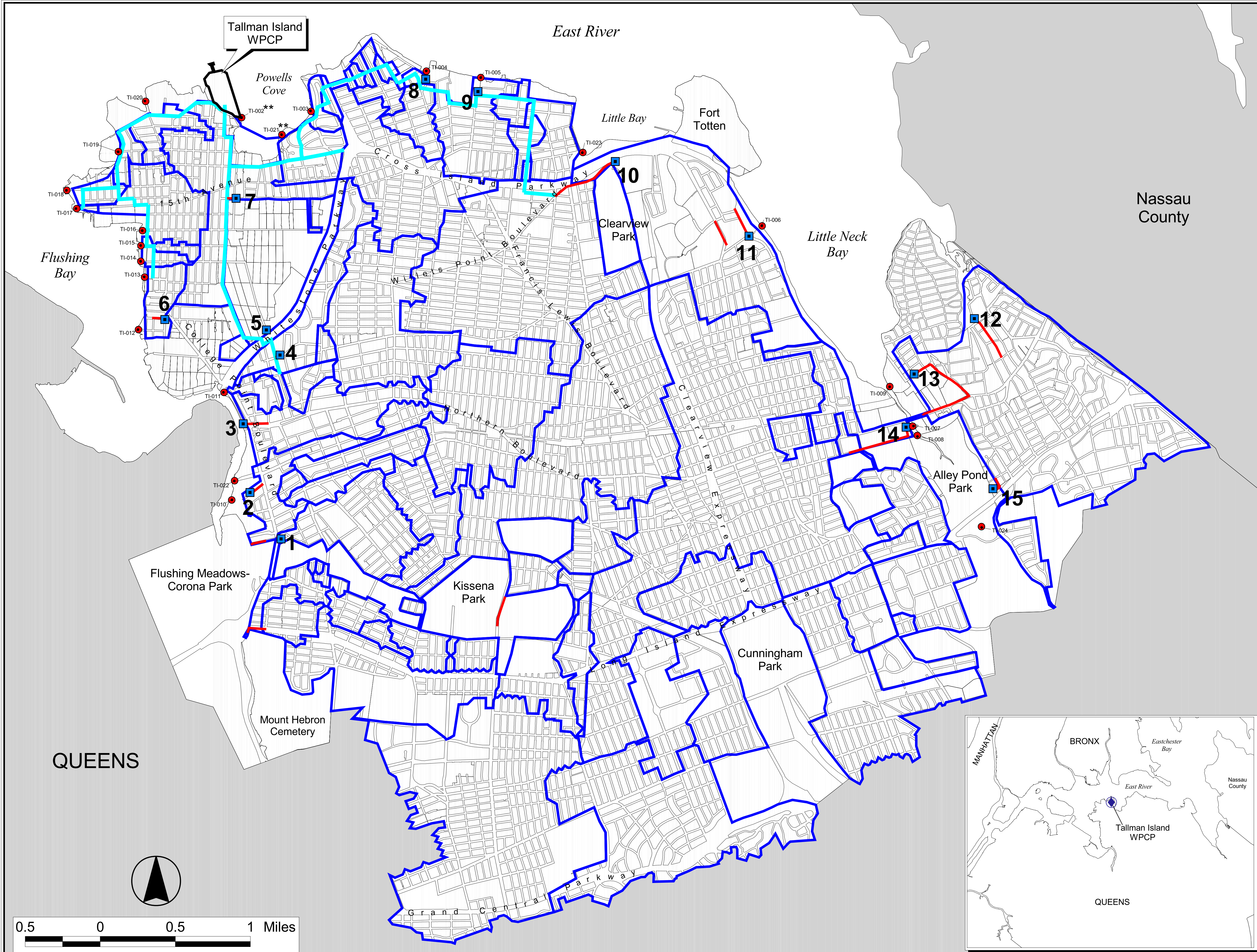

Figure 1-2

System Components

New York City Department of Environmental Protection

Comprehensive Plan for Floatables and Settleable Solids

Tallman Island WPCP Drainage Area

LEGEND

- Combined Sewer Outfall
- Pump Station
- Interceptor
- Force Main
- Regulator Drainage

PUMP STATIONS:

1. Lawrence & Peck
2. 40th Road
3. Flushing Bridge
4. Linden Place
5. New York Times
6. 122nd Street
7. 15th Avenue
8. 6th Road
9. 154th Street
10. Clearview Expressway
11. 24th Avenue
12. Little Neck
13. Douglaston Bay
14. Old Douglaston
15. New Douglaston

NOTES:
** TI-002 and TI-021 have been bulkheaded.

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There are 15 pumping stations within the area tributary to the Tallman Island WPCP, not including the Powell's Cove Station which is located onsite in the Pump and Blower Building and pumps the flow from the College Point Interceptor to the plant headworks. Five of the 15 pumping stations have three pumps each, and the remaining stations have two pumps each. Table 1-1 provides a listing of all the pumping stations within the Tallman Island WPCP tributary and their rated pump capacity.

Table 1-1. Location of Pump Stations

Pump Station	Pump Station Location	Type	Capacity (MGD)
Clearview	Willets Point. Boulevard. Cross-Island Parkway & Roe Place, Bayside, NY 11368	Combined	13.00
24th Avenue	NE corner of 24th Avenue & 217th Street, Bayside, NY 11360	Sanitary	4.30
New Douglaston	Parkland North of LIE, Cross-Island Parkway, Douglaston, NY 11362	Sanitary	3.30
Doug Bay	41st Avenue & 233rd Street, Douglaston, NY 11364	Sanitary	1.00
Linden Place	NE Corner of Linden Place & 31st Road, Flushing, NY 11356	Combined	5.00
6th Road	6th Road & 151st Street, Whitestone, NY 11357	Sanitary	0.72
15th Avenue	SW Corner of 15 Avenue & 131 Street, College Point, NY 11356	Sanitary	2.90
Old Douglaston	Parkland, Northern Boulevard & 234 Street, Douglaston, NY 11362	Sanitary	6.50
Little Neck	40th Avenue & 248th Street	Sanitary	1.40
122nd Street	S-E Corner of 122 Street & 28 Avenue, College Point, NY 11354	Sanitary	1.50
Flushing Bridge.	Lawrence Street & Northern Boulevard., Flushing, NY 11354	Sanitary	1.20
40th Road	40th Road, West of College Point Boulevard, Flushing, NY 11354	Sanitary	2.00
154th Street	Powell Cove's Boulevard. & 154th Street, Whitestone, NY 11357	Combined	2.30
Lawrence & Peck	50-01 College Point Boulevard., Flushing, NY 11355	Combined	14.00
New York Times	Whitestone Expressway West Service Road N/O Linden Place	Sanitary	0.64

There are 61 regulators in the combined sewer system within the area tributary to the Tallman Island WPCP. Forty-four regulators use diversion weirs, 11 use hydraulic sluice gates, 5 use manual sluice gates, and 1 uses an adjustable hydraulic weir gate to regulate flow to the plant. The purpose of the regulators is to allow all dry weather flow to reach the plant, but to limit the amount of flow entering the plant during wet weather conditions. Table 1-2 provides a listing of all regulators and outfall locations within the Tallman Island WPCP drainage area.

Table 1-2. Location of Regulators and Outfalls

Regulator No.	Regulator Location	Outfall Location	Outfall Size (W x H)
1	120th Street and 5th Avenue.	College Place and East River	24" dia.
2	115th Street and 9th Avenue	9th Avenue and East River	12" dia.
3	110th Street and 14th Avenue	14th Avenue and Flushing Bay	1'-6" x 1'-2"
4	110th Street and 15th Avenue	15th Avenue and Flushing Bay	12" dia.

Table 1-2. Location of Regulators and Outfalls

Regulator No.	Regulator Location	Outfall Location	Outfall Size (W x H)
5	119th Street and 20th Avenue	20th Avenue and Flushing Bay	60" dia.
6	119th Street and 22nd Avenue	22nd Avenue and Flushing Bay	1'-3" x 1'-10"
7	119th Street and 23rd Avenue	23rd Avenue and Flushing Bay	12" dia.
9	Linden Place and 32nd Avenue	32nd Avenue and Flushing Bay	8'-0" x 8'-0"
10	138th Street and 11th Avenue	None	N/A
10A	144th Street and 7th Avenue	W/O 7th Avenue and East River	8'-0" x 8'-0"
10B	144th Street E/O Malba Drive	None	N/A
11	151st Street and 7th Avenue	151st Street and East River	72" dia.
12	154th Street and Powell's Cove Blvd.	154th Street and East River	24" dia.
13	15th Drive and Willets Pt. Boulevard	9th Avenue and Little Bay	13'-6" x 8'-0"
14	162nd Street and Cryders Lane	None	N/A
15	162nd Street and 10th Avenue	None	N/A
16	162nd Street and Powell's Cove Blvd.	None	N/A
17	157th Street and Powell's Cove Blvd.	None	N/A
18	150th Place and 6th Avenue	None	N/A
19	150th Street and 6th Avenue	None	N/A
20	150th Street S/O 5th Avenue	None	N/A
21	150th Street S/O 3rd Avenue	None	N/A
22	149th Place and 3rd Avenue	None	N/A
23	149th Street and 3rd Avenue	None	N/A
24	148th Street and 3rd Avenue	None	N/A
25	147th Place and 3rd Avenue	None	N/A
26	147th Street and 3rd Avenue	None	N/A
27	3rd Avenue E/O Parsons Boulevard	None	N/A
28	Parsons Boulevard and 5th Avenue	None	N/A
29	Oak Avenue and Colden Street	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
30	Quince Avenue and Kissena Boulevard	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
31	Lawrence Street and Blossom Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
32	137th Street and Peck Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
33	138th Street and Peck Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
34	Main Street S/O Peck Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
35	56th Road and 146th Street	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
36	150th Street and Booth Memorial Parkway.	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
37	150th Street and 60th Avenue	Roosevelt Avenue and Flushing	18'-6" x 10'-0"

Table 1-2. Location of Regulators and Outfalls			
Regulator No.	**Regulator Location**	**Outfall Location**	**Outfall Size (W x H)**
		River	
38	Parsons Boulevard. and Booth Memorial Parkway.	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
39	159th Street and Booth Memorial Parkway.	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
40	Fresh Meadow Lane and Peck Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
40A	Gladwin Avenue and Fresh Meadow Lane.	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
41	188th Street and LIE (N.S.)	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
43	192nd Street and 56th Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
44	Peck Avenue and LIE (S.S.)	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
45	73rd Avenue and Utopia Parkway.	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
45A	69th Avenue and Fresh Meadow Lane	None	N/A
46	210th Street and LIE (N.S.)	46th Avenue and Alley Creek	10'-0" x 7'-6"
47	218th Street and LIE (N.S.)	46th Avenue and Alley Creek	10'-0" x 7'-6"
48	Springfield Boulevard and LIE (S.S.)	46th Avenue and Alley Creek	10'-0" x 7'-6"
49	220th Place and 46th Avenue	46th Avenue and Alley Creek	10'-0" x 7'-6"
50	157th Street and 43rd Avenue	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
51	Parsons Boulevard and 32nd Avenue	32nd Street and Flushing Bay	8'-0" x 8'-0"
52	Union Street and 32nd Avenue	32nd Street and Flushing Bay	8'-0" x 8'-0"
53	137th Street and 32nd Avenue	32nd Street and Flushing Bay	8'-0" x 8'-0"
54	Downing Street and 32nd Avenue	32nd Street and Flushing Bay	8'-0" x 8'-0"
55	College Pt. Blvd. and Roosevelt Avenue	40th Road. and Flushing River	7'-0" x 6'-6"
56	Main Street and 40th Road	40th Road and Flushing River	7'-0" x 6'-6"
57	41st Avenue E/O Lawrence Street	40th Road and Flushing River	7'-0" x 6'-6"
58	Sanford Avenue and Frame Place	40th Road and Flushing River	7'-0" x 6'-6"
59	58th Avenue and Lawrence Street	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"
60	Booth Memorial Parkway. and Lawrence Street	Roosevelt Avenue and Flushing River	18'-6" x 10'-0"

The Tallman Island WPCP drainage area has two in-line CSO storage facilities – the Alley Creek Retention Facility and the Flushing Creek Retention Facility. The Alley Creek CSO Retention Facility was designed to capture and store 5 MG of combined sewage at peak design flow; flows in excess of this will be discharged to Alley Creek via outfall TI-008. The WWOP for the Alley Creek facility is in Appendix A. Alley Creek Retention Facility is under construction pursuant to the CSO Order, DEC case# C02-20000107-8 (the "CSO Order"). The Flushing Creek CSO Retention Facility is a 43.4 MG storage facility with flow-through capacity. The facility is comprised of a 28.4 MG CSO storage tank and a 15 MG in-line storage component. It captures and stores the combined sewage that normally overflows to outfall TI-010. The WWOP for the Flushing Creek facility is in Appendix B. These WWOPs present anticipated operating procedures that will be modified and optimized as Tallman Island WPCP and the CSO facility operating staff gain experience in the operation and maintenance of the facilities as each facility is completed and put into operation.

1.1.2 Influent Flow Control Structures

The Tallman Island WPCP was designed with the following influent flow control structures:

- Four automated sluice gates to regulate influent flow to the screen channels;
- Four heavy duty, front raked, mechanically cleaned, non-jamming bar screens provided with shear pins and motor overload protection, automatic timing devices and alarms to warn of high water in the screen channels or screen malfunction;
- Four manually operated screen channel velocity gates that are used to regulate the velocity of the wastewater flow in the screen channels; and
- Four automated effluent gates to isolate the screens and to permit cleaning of individual channels.

Figure 1-3 presents the floor plan of the influent chamber throttling gates and screening facility.

1.1.3 Facility Description

The following describes major treatment components at the Tallman Island WPCP. A schematic of the Tallman Island WPCP process is provided on Figure 1-4, and the site plan is provided on Figure 1-5. Table 1-3 lists the unit process equipment available for service and the corresponding maximum hydraulic capacity associated with the equipment.

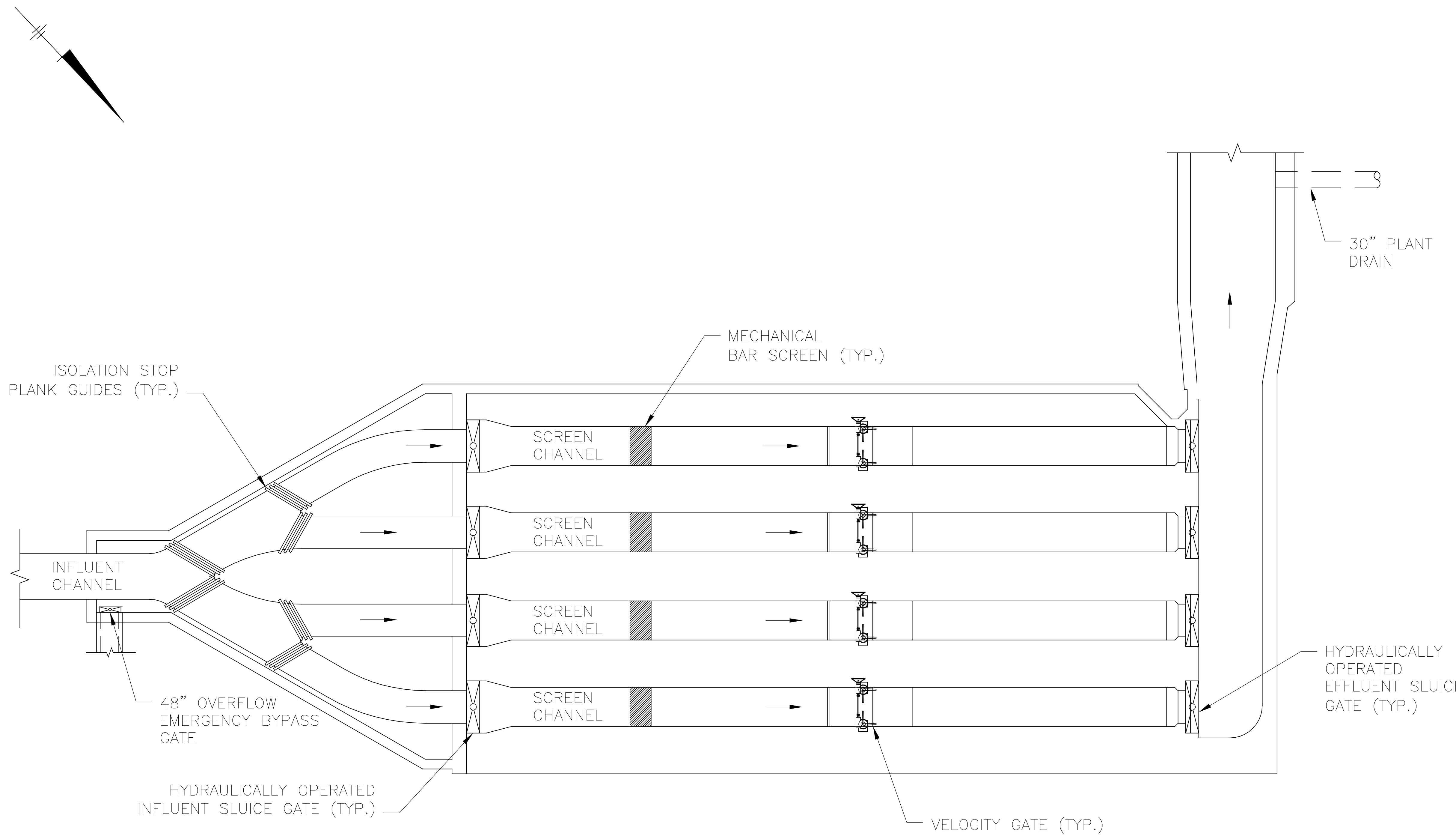

FIGURE 1-3

TALLMAN ISLAND WPCP INFLUENT CHAMBER THROTTLING GATES AND SCREENING FACILITY

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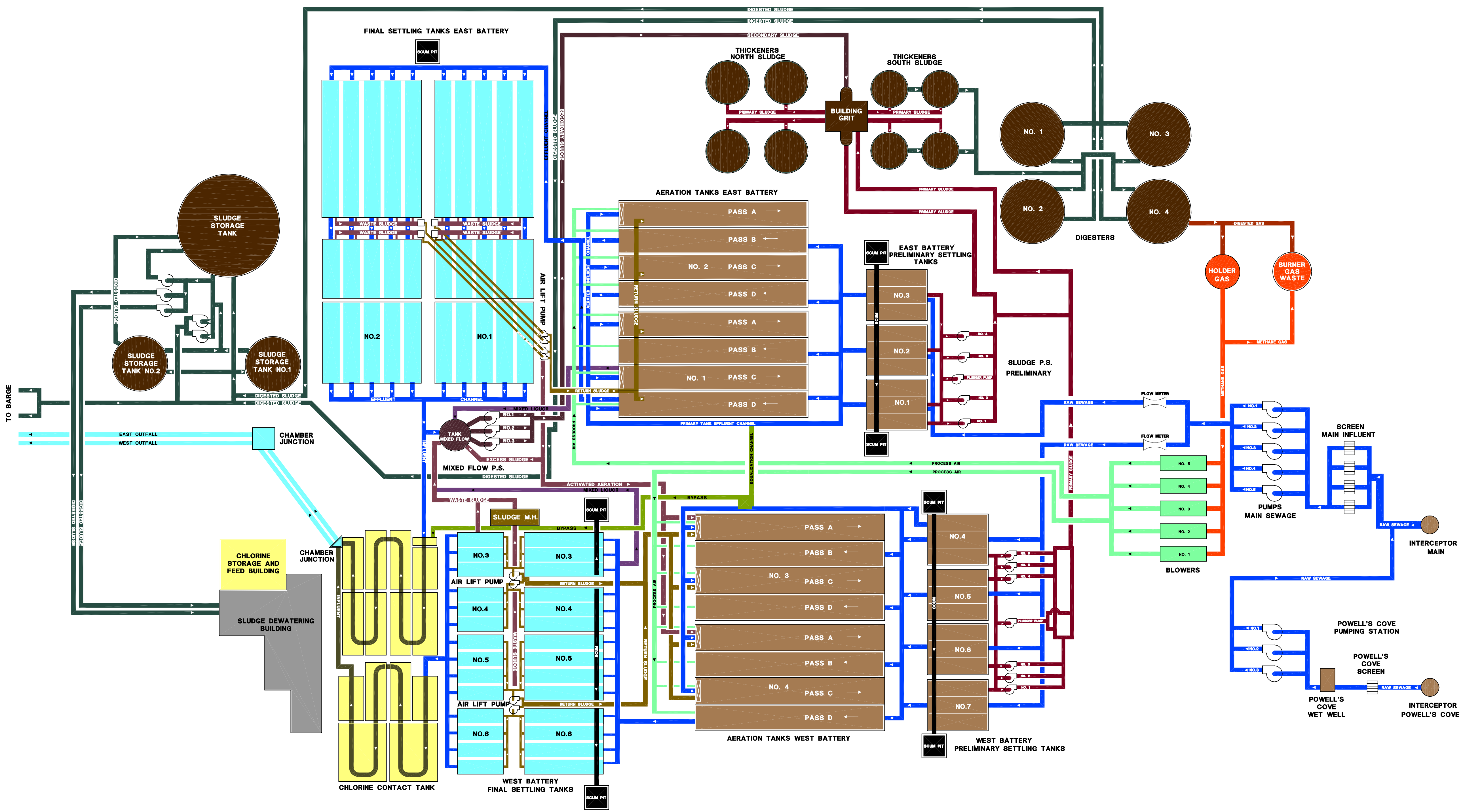

FIGURE 1-4

TALLMAN ISLAND WPCP PROCESS FLOW DIAGRAM

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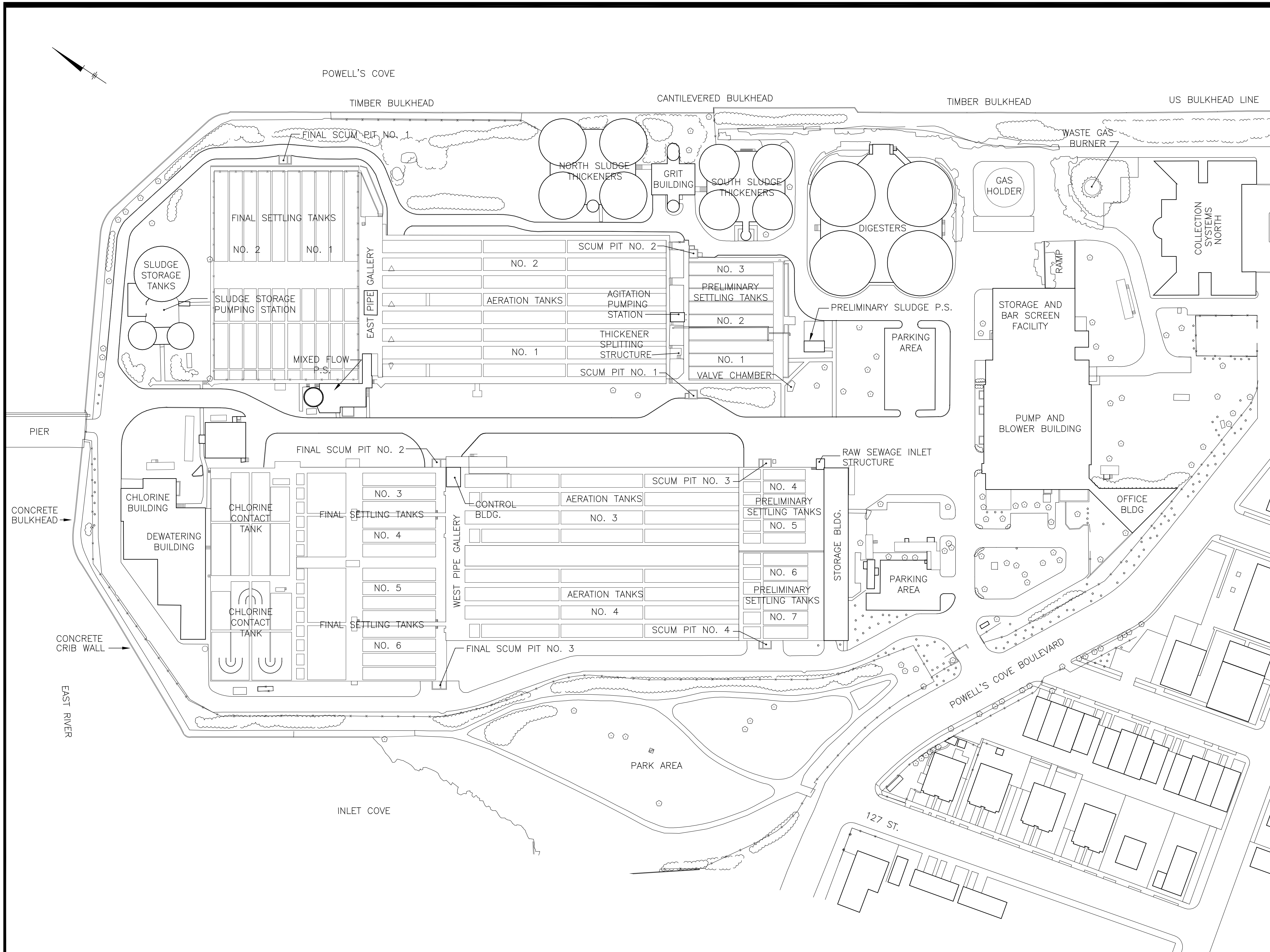

FIGURE 1-5

TALLMAN ISLAND WPCP SITE PLAN

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION DEP

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Table 1-3. Maximum Hydraulic Capacity of Equipment

<table>
<tr><th>Process Equipment</th><th colspan="2">Number of Units in Service</th><th>Maximum Plant Influent Flow</th><th>Maximum Secondary Treatment Flow</th></tr>
<tr><td rowspan="3">Screens</td><td colspan="2">4</td><td>160 MGD</td><td></td></tr>
<tr><td colspan="2">3</td><td>160 MGD</td><td></td></tr>
<tr><td colspan="2">2</td><td>110 MGD</td><td></td></tr>
<tr><td rowspan="2">Main Sewage Pumps</td><td colspan="2">3</td><td>160 MGD</td><td></td></tr>
<tr><td colspan="2">2</td><td>100 MGD</td><td></td></tr>
<tr><td rowspan="7">Primary Settling Tanks</td><td>East Battery</td><td>West Battery</td><td></td><td></td></tr>
<tr><td>3</td><td>4</td><td>160 MGD</td><td></td></tr>
<tr><td>2</td><td>4</td><td>160 MGD</td><td></td></tr>
<tr><td>3</td><td>3</td><td>160 MGD</td><td></td></tr>
<tr><td>2</td><td>3</td><td>160 MGD</td><td></td></tr>
<tr><td>1</td><td>3</td><td>120 MGD</td><td></td></tr>
<tr><td>2</td><td>2</td><td>120 MGD</td><td></td></tr>
<tr><td rowspan="3">Aeration Tanks</td><td>2</td><td>2</td><td></td><td>120 MGD</td></tr>
<tr><td>2</td><td>1</td><td></td><td>90MGD</td></tr>
<tr><td>1</td><td>2</td><td></td><td>90 MGD</td></tr>
<tr><td rowspan="3">Final Settling Tanks</td><td>2</td><td>4</td><td></td><td>120 MGD</td></tr>
<tr><td>2</td><td>3</td><td></td><td>120 MGD</td></tr>
<tr><td>1</td><td>4</td><td></td><td>90 MGD</td></tr>
<tr><td rowspan="2">Chlorine Contact Tanks</td><td colspan="2">2</td><td></td><td>160 MGD</td></tr>
<tr><td colspan="2">1</td><td></td><td>80 MGD</td></tr>
</table>

1.1.3.1 Plant Influent

Wastewater from the Flushing Main Interceptor-Collector and the Whitestone Interceptor-Collector discharges to the plant influent channel by gravity while wastewater from the College Point Interceptor discharges to the Powell's Cove Pumping Station which is located within the Tallman Island WPCP in the Pump and Blower Building. In the Powell's Cove Pumping Station, raw wastewater passes through a mechanically cleaned bar screen channel before discharging to the interceptor before the wet-well. The bar screen channel is a concrete pit approximately 20 feet below grade. From the wet-well, the wastewater is pumped through a 24-inch diameter cast iron force main to the plant main interceptor by three variable-speed centrifugal pumps.

1.1.3.2 Screening

Raw wastewater from the three interceptors enters the Tallman Island WPCP through a set of four mechanically cleaned bar screens located in the lower level of the Pump and Blower Building. Hydraulically operated influent sluice gates regulate flow to the four bar screen influent channels. The velocity through each channel is controlled by manually operated velocity gates. These gates are locked in a fixed position and do not affect the plant's ability to achieve 2xDDWF. The screened wastewater then passes through automated sluice gates to the main sewage pumping wet-well. Mechanical scrapers remove the screenings from the bar screens to a belt conveyor on the ground floor of the Bar Screen Building for storage in containers prior to off-site disposal.

1.1.3.3 Main Sewage Pumping Station

Following the bar screens, the wastewater flows by gravity to the main sewage pumping station wet-well. The main sewage pumping station consists of five variable-speed centrifugal pumps. Three of the pumps have a maximum capacity of 60 MGD each and the other two have a maximum capacity of 55 MGD each. Each pump is driven by direct drive, dual-fuel engine.

Wastewater is pumped from the wet-well to a 72-inch-diameter force main. The 72-inch-diameter force main splits into two separate 54-inch-diameter force mains that serve the East and West Batteries. Each force main has a fabricated venturi meter to measure flow.

1.1.3.4 Preliminary Settling Tanks

There are seven preliminary settling tanks: four on the West Battery and three on the East Battery. Two West Battery preliminary tanks are 96 ft. long by 50 ft. wide and the other two are 96 ft. long by 54 ft. wide. The East Battery consists of three identically sized preliminary settling tanks 124 ft. long by 50 ft. wide. Flow is distributed to the seven preliminary settling tanks through 24-inch by 24-inch sluice gates. Each settling tank has six sluice gates. Primary effluent flows over weirs at the end of each tank into the preliminary settling tanks effluent channel. Scum is removed from each tank by a manually operated rotating scum collectors and is temporarily stored in four scum concentration pits prior to off-site disposal.

Each preliminary settling tank has a chain and flight mechanism to direct settled sludge to the cross-collector channel at the bottom of the influent end of the settling tank. Cross-collectors direct the sludge to a sludge pit and it is then pumped to the primary sludge degritters. Sludge is pumped from the East Battery via four variable-speed torque flow pumps. Sludge is pumped from the West Battery via six variable-speed torque flow pumps. In addition, each battery has a triplex plunger pump for auxiliary service.

Primary sludge from both batteries is pumped through cyclone degritters to remove grit. The degritted sludge is discharged to the gravity thickeners. Grit flows to the grit classifiers/washers where the grit is washed and separated from liquid and stored in containers prior to be disposed of off-site.

The primary effluent from both batteries are connected with an equalization channel that can equalize the flow between the two batteries. The equalization channel is separated from the secondary bypass channel by precalibrated weirs to engage the secondary bypass channel when the plant flow reaches 1.5xDDWF. The secondary bypass channel can accept a maximum flow of 68 MGD.

1.1.3.5 Aeration

From the preliminary settling tanks, the wastewater flows by gravity to the aeration tanks for secondary or biological treatment. The East and West Batteries both have two aeration tanks, each with four passes (A through D). Primary effluent from the East Battery flows into the East Battery aeration tanks through inlet conduits. Wastewater can be fed to the influent of each of the four passes. In passes A and C, primary effluent enters through 48-inch by 36-inch sluice gates. Passes B and C have 30-inch-diameter sluice gates. Return Activated Sludge (RAS) can be conveyed to passes A and/or C through 18-inch-diameter telescoping valves. At the end of pass D, mixed liquor overflows into weir troughs to an effluent channel, which leads directly to the final settling tanks influent channel.

Primary effluent from the West Battery flows into the West Battery aeration tanks through 48-inch by 48-inch sluice gates at the beginning of each pass. RAS is conveyed to the beginning of pass A through 24-inch by 24-inch sluice gates. At the end of pass D, effluent overflows to weir troughs that discharge into 48-inch-diameter effluent pipe. The effluent pipe connects to the final settling tank influent channel.

1.1.3.6 Final Settling Tanks

In the East Battery, aeration tank effluent enters the final settling tank influent channel directly from the aeration tank effluent channel. The East Battery has two rectangular final settling tanks each with five bays. Each bay has a chain and flight mechanism that directs sludge to a cross-collector channel. Cross-collectors direct the sludge to an airlift pump chamber. RAS is conveyed back to the aeration tanks by four airlift pumps. Waste activated sludge (WAS) is drawn off from the airlift pump chamber to the mixed flow pumping station. Effluent from the East Battery is directed to the chlorine contact tanks.

In the West Battery, aeration tank effluent discharges to the final settling tank influent channel from the 48-inch-diameter aeration tank effluent pipe. The West Battery has two rectangular final settling tanks each with three bays, and two rectangular final settling tanks, each with four bays. Each bay has a chain and flight mechanism that directs sludge to a cross-collector channel. Cross-collectors move the sludge to the airlift pit where RAS is pumped by four airlift pumps. WAS is removed by draw-off lines at waste sludge manholes. From the manholes, the WAS flows by gravity to the mixed flow pumping station. Effluent from the West Battery is directed to the chlorine contact tanks.

1.1.3.7 Chlorination

Effluent from the East and West Battery final tanks discharge to two chlorine contact tanks. Each tank consists of four bays of approximately 25 feet in width and 10 feet in depth. The East Battery tank is 143 feet long and the West Battery is 130 feet long. Sodium hypochlorite solution is pumped to the influent through diffusers. A detention time of approximately 37 minutes is provided in both tanks under dry-weather design flow conditions. Baffles just downstream of the diffusers promote mixing of the sodium hypochlorite and the wastewater. Flow into each tank is controlled through influent sluice gates and stop planks. Effluent then flows by gravity into the plant outfall.

1.1.3.8 Gravity Sludge Thickening

The Tallman Island WPCP has two sets of four (8 total) circular, conical-bottomed gravity thickeners. The north gravity thickeners are 60 feet in diameter and the south gravity thickeners are 50 feet in diameter. Each thickener contains a picket-type stirring mechanism that aids thickening and directs sludge to the center pit where it is pumped to anaerobic digesters. For each thickener, two plunger pumps directly below the tank pump the sludge into the digester-heating loop.

1.1.3.9 Sludge Digestion

The Tallman Island WPCP sludge digestion facilities consist of four fixed-cover digesters, heat exchangers, draft tube mixers, gas flare, sludge and gas storage facilities, and ancillary equipment.

Thickened sludge is pumped into the heat exchanger return line to the digesters. Sludge is mixed within each digester by three draft tube mixers. To heat the digester contents, sludge is pumped from the digesters through external heat exchangers. Each digester has a dedicated heat exchanger. The main heat source for the heat exchangers is the engine jacket cooling water system.

Sludge is removed from each digester using four pipes at various depths and locations within the digester. The pipes are manifolded to four sludge transfer pumps. The pumps can either pump sludge to two of the three storage tanks or return it to the digester for further digestion.

Currently the sludge is pumped from the storage tanks through two dedicated sludge pumps to two sludge centrifuges in the dewatering building. The dewatered sludge is then removed and trucked out of the plant. The centrate is returned to the head of the plant by gravity.

1.2 EFFLUENT PERMIT LIMITS

The Tallman Island WPCP effluent discharge requirements are regulated under SPDES Permit No. NY002 6239. The permit requirements as of April 2007 are summarized on Table 1-4.

Table 1-4. Effluent Permit Limits

Parameter	Limit
Dry Weather Flow, 30-day arithmetic mean	80 mgd
BOD5, 30-day arithmetic mean	30 mg/l (1,2)
	20,016 lb/day (1,2)
BOD5, 7-day arithmetic mean	45 mg/l (2)
	30, 024 lb/day (2)
BOD5, 6-consecutive-hour average	50 mg/l (2)

Table 1-4. Effluent Permit Limits

Parameter	Limit
TSS, 30-day arithmetic mean	30 mg/l (1,2)
	20,016 lb/day (1,2)
TSS, 7-day arithmetic mean	45 mg/l (2)
	30, 024 lb/day (2)
TSS, 6-consecutive-hour average	50 mg/l (2)
Effluent Disinfection	All Year (2)
Fecal Coliform, 30-day arithmetic mean	200/100 ml
Fecal Coliform, 7-day arithmetic mean	400/100 ml
Fecal Coliform, 6-hour geometric mean	800/100 ml
Total Chlorine Residual, daily maximum	2.0 mg/l (3)
pH, range	6.0 to 9.0 SU

(1) Effluent values shall not exceed 15 percent of influent values

(2) During periods of wet weather influence, it is recognized that permittee may not be able to meet BOD5 and suspended solids limits for effluent concentrations and mass loadings. Relief from these requirements shall be granted if permittee can demonstrate that treatment is being maximized while up to treatable flow is being accepted.

(3) During periods of wet weather influence, in order to achieve proper fecal coliform kill it may be necessary to exceed chlorine residual limit. Relief shall be granted if permittee can demonstrate that such exceedances are necessary in order to provide optimum disinfection.

1.3 PERFORMANCE GOALS FOR WET WEATHER EVENTS

The goal of this WWOP is to maximize the treatment of wet weather flows at the Tallman Island WPCP and reduce the volume of Combined Sewer Overflows (CSO) released to the East River and Flushing Bay.

There are three primary objectives in maximizing treatment for wet weather flows including:

- Consistently achieve primary treatment and disinfection standards for wet weather flows up to 160 Million Gallons per Day (MGD). In doing so, this plant will satisfy the level of treatment required under the State Pollution Discharge Elimination System (SPDES) permit.

- Consistently provide secondary treatment for wet weather flows up to 120 MGD before bypassing the secondary treatment system in order to satisfy the level of treatment required under the SPDES permit.

- Consistently maintain effluent water quality standards upon return to dry weather operations.

1.4 PURPOSE OF THIS WWOP

The purpose of this WWOP is to provide a set of operating guidelines to assist Tallman Island WPCP staff in making operational decisions which will best meet the performance goals stated in Section 1.3 and the requirements of the SPDES discharge permit. During a wet weather event, numerous operational decisions must be made to effectively manage and optimize treatment of wet weather flows. Plant flow is controlled through influent pump operations and adjustment of the four main interceptor-throttling gates. Flow rates at which the secondary bypass is used are dependant upon a complex set of factors, including conditions within specific treatment processes and anticipated storm intensity and duration. Each storm event produces a unique combination of flow patterns and plant conditions. No WWOP can describe the decision making process for every possible wet weather scenario which will be encountered at the Tallman Island WPCP. This WWOP can, however, serve as a useful reference that operators can utilize during wet weather events. The manual can be useful in preparing for a coming wet weather event, a source of ideas for controlling specific processes during the storm, and a checklist to avoid missing critical steps in monitoring and controlling processes during wet weather.

1.5 USING THE WWOP

This manual is designed to allow use as a reference during wet weather events. Section 2 is broken down into sub-sections that cover major unit processes at the Tallman Island WPCP. Each protocol for the unit process includes the following information:

- List of unit processes and equipment covered in the section;
- Steps to take before a wet weather event and who is responsible for these steps;
- Steps to take during a wet weather event and who is responsible for these steps;
- Steps to take after a wet weather event and who is responsible for these steps;
- Discussion of why the recommended control steps are performed;
- Identification of specific circumstances that trigger the recommended changes; and
- Identification of things that can go wrong with the process.

The WWOP is a living document. Users of the WWOP are encouraged to identify new steps, procedures, and recommendations to further the objectives of the manual. Modifications which improve the procedures outlined in this WWOP are encouraged. With continued input from the experienced operations staff, this WWOP will become a useful and effective tool.

1.6 REVISIONS TO THIS WWOP

In addition to the revisions based on plan operating experience, this manual will be revised as upgrade work is completed that affects the plants ability to treat wet weather flows. The TI WPCP is currently undergoing a BNR upgrade pursuant to the Judgment. As required, a revised WWOP will be issued for operating procedures during construction. Also, a final revised WWOP, including specific procedures based on actual operating experiences of the upgraded WPCP, will be issued after the completion of the construction.

2.0 UNIT PROCESS OPERATIONS

The following section presents equipment summaries and wet weather operating protocols for each major unit process at the Tallman Island WPCP. This evaluation includes descriptions of associated equipment, basis for protocols, and events or observations that trigger the protocol. Operating protocols are divided into tasks to be completed before, during, and after wet weather conditions.

2.1 HEADWORKS

2.1.1 Equipment

Unit Processes	Equipment
Powell's Cove Pumping Station Influent Gates	1- Motorized Influent Sluice Gate
Powell's Cove Influent Screen	1- Manually Cleaned Bar Screen 1- Mechanically Cleaned Bar Screen
Plant Influent Gates	4- Automated Influent Sluice Gates
Plant Influent Screens	4- Bar Screens 4- Motorized Effluent Sluice Gates 4- Velocity Gates 1- Belt Conveyor 10 Cubic Yard Screenings Containers

2.1.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• Powell's Cove Influent Gate is left fully open. • Powell's Cove screen is in service and manually cleaned as necessary. • The Plant Influent Gates are typically in automatic mode where the gate bottom is submerged approximately two inches below the water surface elevation to keep gas and odor in the interceptor. • Typically, two of the four Plant Influent Gates are in operation during dry weather and prior to wet weather conditions. The shift supervisor decides the specific gates and channels in use. • Evaluate the need for maintenance or repair of the throttling gates and associated equipment. • Bar screen mechanism is set for both time and level differential. Visually inspect screen to confirm proper operation.
SEE	SSTW/STW	• Rotate screen operation to ensure that all available screens and associated components are in working order. • Evaluate the need for maintenance or repair of the bar rakes and associated equipment. Make sure empty screenings containers are available. • Replace 10 cubic yard containers as needed.

<table>
<tr><td colspan="3">During Wet Weather Event</td></tr>
<tr><td>SEE</td><td>SSTW/STW</td><td>• Leave gate in automatic position until:
o Plant flow approaches 160 MGD; or
o Wet-well level exceeds maximum level; or
o Bar screens become overloaded with debris; or
o Conditions warrant going to manual ex. high wet well levels could cause the gates to close under automatic operation.
• Maintain acceptable wet-well level during throttling gate operation.
• Record all throttling adjustments on the Sluice Gate Log.
• If all channels are in service and channel flow continues to rise, constrict the influent sluice gates as necessary to keep channels from flooding.
• Visually monitor the screen channel flow. If the channel level is rising put another screen in service.
• If screen blinding occurs, place another screen in service.
• If the screening conveyor fails, direct the screen chute to the 1 cubic yard container and as each 1 yard container gets full, empty screenings into 10 cubic yard containers.
• Switch bar rakes to continuous cleaning mode.
• Evaluate the need for maintenance or repair of the bar rakes and associated equipment.
• Replace 10 cubic yard containers as needed.</td></tr>
<tr><td colspan="3">After Wet Weather Event</td></tr>
<tr><td>SEE</td><td>SSTW/STW</td><td>• If the main Influent Sluice Gates are controlling flow, return them to the fully open position to receive all backed up floatables. Return gates to automatic mode once backed up floatables have been cleared.
• Evaluate the need for maintenance or repair of the throttling gate and associated equipment.
• As channel flow height continues to lower, determine when gates may be fully closed and channels taken off-line to return to normal operation of two gates/channels.</td></tr>
<tr><td>SEE</td><td>SSTW/STW</td><td>• Switch bar rakes from continuous cleaning to automatic cleaning (differential elevation or timer control mode).
• Shovel screenings that may have overflowed back into the container.
• Evaluate the need for maintenance and repair the bar rakes and associated screening equipment as necessary.
• Replace 10 cubic yard containers as needed.</td></tr>
<tr><td colspan="3">Why Do We Do This?</td></tr>
<tr><td colspan="3">• Bar screens prevent damage to downstream wastewater pumps by removing large debris from the raw wastewater stream. Bar rakes clear debris from the bar screen continuously during wet weather flow to prevent bar screen blinding. Elevated levels of debris are observed during wet weather conditions.
• The influent sluice gate is adjusted to maximize flow into the WPCP without flooding bar screens, bar channels, screen room, and wet well. Flooding of these areas will reduce plant performance and decrease plant stability and could result in damage to the main sewage pumps.</td></tr>
<tr><td colspan="3">What Triggers the Change?</td></tr>
</table>

- Auxiliary bar screens are put into service to accommodate high flows during wet weather conditions. Bar rakes operate continuously during wet weather conditions to prevent increased debris from blinding bar screens.
- High flow rates, wet well level, and rising level of flow in bar screen channels indicate that throttling with the sluice gate is necessary.

What Can Go Wrong?
• Blinding of bar screens. • Sluice gate failure.

2.2 INFLUENT WASTEWATER PUMPING

2.2.1 Equipment

Unit Processes	Equipment
Powell's Cove Pumping Main Wet-Well Equipment	3- Main Sewage Pumps (3 @ 4,200gpm) 2- Float Level Sensor in Wet Well
Main Sewage Pumping Equipment	5- Main Sewage Pumps (2 @ 55MGD and 3 @ 60MGD) 5- Engine Drive Units 5- Cone Check Valves 1- Wet Well Level Sensor 2- Venturi Flow Meters

2.2.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• For Powell's Cove Pump Station during dry weather, 1 pump is generally in service and 2 spare pumps are available. At the Plant during dry weather, 1 or 2 main sewage pumps are in service and at least 3 pumps may be on standby. • All pumps are generally cycled to ensure all pumps are in working order. • Check that all wet well level monitors are functional. • Number and speed of pumps in service are selected and manually adjusted by operator in the pump control room. • Adjustments are made based on maintaining wet well level. • Monitor pumped flow based on wet well level, number of pumps in service and read-outs from Venturi meters. • Repair pumps and associated equipment as necessary.
During Wet Weather Event		
SEE	SSTW/STW	• Monitor wet well elevation. • As wet well level rises, put off-line pumps in service as necessary. • Pump to maximum plant capacity during wet weather event and when possible leave one pump available as standby. • All adjustments are made manually by operators based on maintaining wet well level within desired operating range. • Restrict flow through influent gates if pumping rate is maximized and wet well level continues to rise.

After Wet Weather Event		
SEE	SSTW/STW	• Maintain pumping rate as required to keep wet well level in operating range. • If influent gates have been throttled, maintain maximum pumping rate until all previously constricted influent gates are returned to normal operating position, flow begins to decrease lowering wet well level and flow stored in collection systems is brought to the Plant.
SEE	SSTW/STW	• Reduce number of pumps in service to maintain wet well level and return to dry weather operation. • Investigate pump malfunctions and repair pumps and associated equipment as necessary.
Why Do We Do This?		
• Maximize flow to treatment plant, and minimize need for flow storage in collection system and associated storm overflow from collection system into Long Island Sound. • To allow the plant to pump the maximum flow through the preliminary treatment tanks without flooding the wet well or bar screen channels.		
What Triggers the Change?		
• Rises and falls in wet-well water level control the number of pumps online.		
What Can Go Wrong?		
• Pump fails to start. • Pump fails while running. • Pump engine failure. • Cone check valve failure.		

2.3 PRELIMINARY SETTLING TANKS

2.3.1 Equipment

Unit Processes	Equipment
East and West Battery Preliminary Settling Tanks	7- Preliminary Settling Tanks (4 in West Battery, 3 in East Battery) 12- Primary Sludge Transfer Pumps (7 in East Battery, 5 in West Battery) 4- Scum Pits (2 in each Battery) with clamshell hoisting equipment 21- Longitudinal Collectors (3 per PST) 7- Sludge Trough Cross-Collector (1 per PST) 42- Influent Sluice Gates (6 per PST) 21- Rotating Scum Collectors (3 per PST)

2.3.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• All 7 settling tanks are normally in operation during dry weather conditions. • Check the sludge collector operation and inspect tanks for broken flights. • Check surface scum collection system operation and remove scum as necessary. • Check primary sludge pump operation.
SEE	SSTW/STW	• Maintain scum pits by cleaning regulary • Repair primary sludge pumps and associated equipment as necessary.
During Wet Weather Event		
SEE	SSTW/STW	• One primary sludge pump is in service for each tank with adequate standby pumps available. • Watch water surface elevations at the weirs for flow imbalances. • Check the level of both preliminary tank influent channels. • Check the effluent weirs and, if flooding is occurring, notify supervisor. • Check primary sludge pumps for proper operation. Switch pumps in service as necessary. If the sludge pump suction line appears clogged, shut the pump and back flush. • If the tank cross collector fails, remove the tank from service. • In case of longitudinal collector failure, maintain final tank in service. Balance flows to the tanks to keep the blanket levels even.
After Wet Weather Event		
SEE	SSTW/STW	• Repair equipment failures as necessary. • Check tank collectors for normal operation. Notify supervisor of sheared pins, broken chain or chains off the sprocket. • Remove scum from preliminary tanks as necessary. • Maintain scum pits by cleaning regularly
Why Do We Do This?		
• Preliminary settling tanks protect downstream mechanical equipment and pumps from abrasion and accompanying abnormal wear, and prevent accumulation of grit in aeration tanks and downstream processes. • To maximize the amount of flow that receives primary treatment. • To protect downstream processes from solids overload and scum accumulation.		
What Triggers the Change?		
• Excessive flow and consequent increased grit accumulations.		
What Can Go Wrong?		
• Tank collection system failure • Primary sludge pump failure • Grease carryover to the aeration tanks.		

2.4 GRIT REMOVAL

2.4.1 Equipment

Unit Process	Equipment
Grit Removal	4- Cyclone Sludge Degritters 4- Grit Classifiers 6 cubic yard Containers 1- Mechanically Cleaned Secondary Bar Screen

2.4.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• Secondary bar screen is in operation. • One grit cyclone feeding one grit classifier is the normal operation. All 4 units are in service. • Verify that empty grit containers are available. If not, contact the supervisor to bring empties and remove full containers. • Repair any equipment failure as necessary.
During Wet Weather Event		
SEE	SSTW/STW	• No changes are made during wet weather event.
After Wet Weather Event		
SEE	SSTW/STW	• No changes are made after wet weather event.
Why Do We Do This?		
• To protect the downstream equipment from abnormal wear and to prevent accumulation of grit in the aeration tanks and digesters.		
What Triggers the Change?		
• No changes are made.		
What Can Go Wrong?		
• Grit cyclones can clog. • Grit classifier failure. • Accumulation of grit in aeration tanks.		

2.5 SECONDARY SYSTEM BYPASS

2.5.1 Equipment

Unit Processes	Equipment
Bypass Channel	1- Venturi Flow Meter (not in service) 2- Fine Tune Gates (with actuators not in service) 8- Fixed Weirs (stop planks)

2.5.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• No changes are made before a wet weather event.

During Wet Weather Event		
SEE	SSTW/STW	• Visually monitor the bypass channel.
After Wet Weather Event		
SEE	SSTW/STW	• No changes are made after a wet weather event.
Why Do We Do This?		
• The bypass channel is used to relieve flow to the aeration system, to avoid excessive loss of biological solids, and to relieve primary clarifier flooding. • To prevent secondary system failure due to hydraulic overload.		
What Triggers the Change?		
• No changes are made.		
What Can Go Wrong?		
• N/A		

2.6 AERATION TANKS

2.6.1 Equipment

Unit Processes	Equipment
Aeration Tanks	4- Aeration tanks (2 in each Battery) 5- Blowers 16- Influent Sluice Gates 4- Telescoping Valves (East Battery) 4- Return Sludge Sluice Gates (West Battery) 37- Mixers 4- Dissolved Oxygen Probes (1 per tank) 4- Spray Water Pumps Diffusers

2.6.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• All aeration tanks are in operation during dry weather conditions. • The plant operates in a step feed mode, which requires even air distribution to each pass.
SEE	SSTW/STW	• Check the dissolved oxygen (DO) levels and control airflow to maintain at least 2 mg/L (with an average of 4 mg/L) DO in the aeration tanks. • Check telescoping valves for clogging with rags and other debris and temporarily lower valve (1 minute or so) to increase flow and flush debris then return to normal level. • Check damage to air piping system and repair as necessary.
During Wet Weather Event		
SEE	SSTW/STW	• No changes are made during a wet weather event.

After Wet Weather Event		
SEE	SSTW/STW	• No changes are made after a wet weather event.
Why Do We Do This?		
• Wasting is adjusted to maintain steady aeration tank inventory. • Aeration tank operations do not change between dry and wet weather flows.		
What Triggers the Change?		
• There are no significant changes to the aeration tank operations during wet weather.		
What Can Go Wrong?		
• Dissolved Oxygen drops below 2 mg/L. • Mixed flow sludge pump failure. • No return sludge.		

2.7 FINAL SETTLING TANKS

2.7.1 Equipment

Unit Processes	Equipment
Final Settling Tanks	6- Final Settling Tanks (2 in the East Battery, 4 in the West battery) 8- RAS Pumps (4 in each Battery) 3- Wasting Pumps 44- Inlet Sluice Gates 44- Longitudinal Collectors 6- Sludge Trough Cross Collectors 26- Rotating Scum Collectors 3- Scum Pits 8- Telescoping weirs (West Battery) 1- Gate (East Battery)

2.7.2 Wet Weather Operation Protocols

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• All final settling tanks are in service during dry weather conditions. • Skim tanks as necessary. • Check the flow balance to all tanks in service. • Observe effluent quality. • Check RAS/WAS pumps in service for proper operation. • Check tank collectors for proper operation. • Check the effluent quality. Notify the supervisor if solids are washing out over the weirs. • Check the RAS/WAS pump flow rate. • If tank cross collector fails, remove tank from service.
During Wet Weather Event		
SEE	SSTW/STW	• In case of longitudinal collector failure, maintain final tank in service. Balance flows to the tanks to keep the blanket levels even.

After Wet Weather Event		
SEE	SSTW/STW	• Modify the sludge wasting based on MLSS levels and recommendation from Process Engineer. • Observe effluent clarity. • Skim the clarifiers if needed. • Repair equipment failures as necessary.
Why Do We Do This?		
• To prevent solids washouts from secondary clarifiers.		
What Triggers the Change?		
• Rising sludge blankets that cannot be controlled • Flooding of weirs		
What Can Go Wrong?		
• RAS/WAS pump failure. • Solids washout at the final effluent weirs. • Broken sludge collection equipment. • Secondary clarifier weirs are flooded.		

2.8 SLUDGE THICKENING, DIGESTION, STORAGE AND DEWATERING

2.8.1 Equipment

Unit Processes	Equipment
Sludge Thickening	8- Gravity Thickeners 16- Thickened Sludge Pumps
Anaerobic Digestion	4- Digesters (1 used as Sludge Storage Tank) 4- Heat Exchangers 2- Engine Jacket Cooling Water Pumps 8- Sludge Recirculation Pumps 4- Sludge to Storage Pumps
Sludge Storage	1- Sludge Mixing/Sludge to Barge Pump 3- Sludge Storage Tanks 2- Sludge Dewatering Pumps 1- Pump Back/Sump Pump
Dewatering	2- Centrifuges 3- Mixed Polymer Storage Tanks 2- Polymer Feed Pumps 2- Polymer Transfer Pumps 1- Bulk Polymer Storage Tank 1- Hypochlorite Storage Tank 4- Hypochlorite Feed Pump 1- Hypochlorite Gravity Feed Piping 1- Caustic Storage Tank 4- Caustic Feed Pumps 1- Ferric Chloride Storage Tank Hoppers with screens 1- Ferric Chloride Feed Pump 3- Dilution Water Pumps

2.8.2 Wet Weather Operation Protocols

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• Five gravity thickeners are in operation during dry weather conditions. • Five thickened sludge pumps are in operation during dry weather conditions. • One sludge to storage pump is in operation during dry weather conditions. • One sludge dewatering is in operation during dry weather conditions. • One or two centrifuges are in operation five days a week. • One polymer feed pump is in operation during dry weather conditions. • One or two polymer transfer pumps are in operation as needed during dry weather conditions.
SEE	SSTW/STW	• Thickener Pump timer settings are adjusted if necessary based on solids inventory in the tank.
During Wet Weather Event		
SEE	SSTW/STW	• No changes are currently made during wet weather.
After Wet Weather Event		
SEE	SSTW/STW	• Repair equipment failures as necessary. • The thickened sludge pumping rate may require adjustment due to a reduction in wasting following a wet weather event.
Why Do We Do This?		
• No changes are made during wet weather conditions.		
What Triggers the Change?		
• No changes are made during wet weather conditions.		
What Can Go Wrong?		
• Thickened collector mechanism failure • Thickened sludge pump failure • Sludge recirculation pump failure • Sludge to storage pump failure • Centrifuge failure • All chemical transfer and feed pump failure • Sludge Mixing pump failure • Sludge Dewatering pump failure		

2.9 EFFLUENT CHLORINATION

2.9.1 Equipment

Unit Processes	Equipment
Effluent Chlorination	2- Chlorine Contact Tanks 3- Sodium Hypochlorite Storage Tanks 3- Hypochlorite Feed Pumps 3- Dilution Water Pumps 3- Effluent Water Pumps 4- Chlorine Residual Analyzers with control system 4- Effluent Ultrasonic Flow Meters 1- Influent Gate 1- Duplex Strainer

2.9.2 Wet Weather Operation Protocol

WHO DOES IT?		WHAT DO WE DO?
SUPERVISORY	IMPLEMENTATION	
Before Wet Weather Event		
SEE	SSTW/STW	• Make sure chlorine contact tanks are in service. • Make sure there are sufficient chlorine residual test kit supplies. • Check and maintain hypochlorite tank levels. If low, isolate the tank and place a different tank on-line. Request delivery if necessary. • Check operation of sodium hypochlorite feed pump and dilution water pump. • Check and adjust hypochlorite feed rates to maintain adequate residual. • Clean duplex strainer as necessary.
During Wet Weather Event		
SEE	SSTW/STW	• Check and adjust hypochlorite feed rates to maintain adequate residual. • Increase the chlorine residual measurements to hourly.
After Wet Weather Event		
SEE	SSTW/STW	• Check and adjust hypochlorite feed rates to maintain adequate residual. • Check and maintain hypochlorite tank levels. Request delivery if necessary. • Repair equipment failures as necessary. • Clean duplex strainer as necessary.
Why Do We Do This?		
• During wet weather conditions, hypochlorite demand may change (increase or decrease). Need to adjust hypochlorite feed in order to maintain adequate disinfection of effluent.		
What Triggers the Change?		
• High flows and secondary bypasses may increase hypochlorite demand.		
What Can Go Wrong?		
• Failure of a hypochlorite feed pump • Failure of a dilution water pump • Failure of a check valve on hypochlorite feed pump piping • Clogging of duplex strainer		

3.0 PLANNED PLANT UPGRADE

The Tallman Island WPCP is scheduled to undergo a construction upgrade program to address the facility's critical needs and upgrade the aeration process for BNR pursuant to the Judgment.

This section summarizes the major improvements anticipated to be implemented as part of the first phase of the Plant Upgrade Program.

3.1 MAIN SEWAGE PUMPING STATION

The existing main sewage pumps, suction, discharge piping and valves will be demolished and replaced with five new centrifugal-type pumps each capable of pumping 60 MGD. The facility will have the capability of pumping at least 160 MGD to the preliminary settling tanks during wet weather with three pumps in operation. During this work, a temporary pump around system will be installed in the influent channels following the primary screens. The temporary pumping system will be capable of pumping a maximum flow of 120 MGD. As a result, during and temporary pumping period, the Tallman Island WPCP will only be able to process a maximum wet weather flow of 120 MGD or 1.5 x the design dry weather flow (DDWF). The existing conveyor system for the Main Influent Screens will be demolished and replaced in-kind. This work should have no effect of the Plant's ability to accept and treat wet weather flow.

The Powells Cove Pumping Station, located in the plant's Pump and Blower Building, will also be upgraded. The existing pumps and climber screen will be demolished and replaced with three new pumps each capable of 4 MGD and a new climber screen. Temporary pumping units capable of handling the entire Powells Cove Pumping Station flow will be provided during this phase of the work. As a result, this work will not impact the Plant's ability to accept and/or treat wet weather flow.

3.2 AERATION TANKS

The aeration tanks at the Tallman Island WPCP will be modified to provide basic step-feed BNR. Baffles will be added to allow for anoxic and oxic treatment zones. Mixers will be provided in the anoxic zones to maintain the suspension of biomass. A new aeration system including fine bubble diffusers will be provided along with new centrifugal process air blowers. The existing air header will be rehabilitated to reduce air losses and a new dissolved oxygen (DO) control system will be provided. The existing spray water system will be demolished and replaced with a new system capable of providing full tank coverage. New influent gates will be added to the aeration tanks to allow for uniform flow distribution to each pass. Automation will need to be provided to allow storm flow to be sent to Pass D of each aeration tank so as to prevent biomass washout. Two froth control hoods will be added in Pass A and B to reduce sludge bulking. Surface wasting will also be provided to maintain the SRT and prevent nocardia and foam accumulation. Centrate from the dewatering building will be conveyed to Pass A of the aeration tanks by gravity. As with the preliminary tank work, only one aeration tank will be allowed to be taken out of service by the contractor at any time. As a result, the system should be capable of processing a wet-weather flow of 120 MGD for short durations without a significant effect on overall treatment performance.

3.3 RAS AND WAS SYSTEM

New submersible RAS pumps will be added to the system with the capacity of 50 to 60 percent of design dry weather flow. This is the currently recommended RAS rate from the Comprehensive Nitrogen Management Team (CNMT). RAS chlorination will be provided to prevent sludge bulking. WAS will be conveyed from Pass A and B of the aeration tanks. Additional instrumentation will be provided to measure RAS flow and RAS total suspended solids (TSS) concentrations.

3.4 GRAVITY THICKENERS

Four of the existing eight gravity thickeners will undergo complete rehabilitation. New mechanisms, drive units, over-flow piping and sludge pumps will be provided under this phase of the upgrade. Only five gravity thickeners are required by the plant at any time. As a result, the Contractor will be allowed to upgrade two gravity thickeners at any time, and should have no effect on the plant's ability to process wet weather flows.

3.5 MIXED FLOW PUMPING STATION

The existing pumps in the mixed flow pump station will be demolished and replaced. Due to the current space limitation, the pumps will be replaced in-kind with new pumps of the same capacity. As part of this upgrade, the spray water system will also be replaced. The capacity of the spray water system will be increased, but only to the extent possible within the existing foot print of the mixed flow pumping station. Only one mixed flow pump will be allowed to be taken out of service at any time. As a result, this work will have no effect on the plant's ability to treat wet weather flows.

3.6 SLUDGE DIGESTION AND STORAGE

The existing covers on the four digesters will be demolished and replaced. New gas piping will be provided from the digester tank covers to the gas compressor building. New piping will be provided from the digester sludge transfer pumps to the existing sludge storage tanks located near the dewatering building.

APPENDIX A

ALLEY CREEK CSO RETENTION FACILITY WWOP

Alley Creek CSO Retention Facility
Bayside, New York

Wet Weather Operating Plan
Alley Creek CSO Retention Facility

Prepared for:
The New York City Department of Environmental Protection
Bureau of Engineering, Design and Construction

Prepared by:
URS Corporation
Paramus, New Jersey

June 2003
(Revised December 2003)
(Revised October 2007)

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LIST OF FIGURES

1. INTRODUCTION

The purpose of a wet weather operating plan (WWOP) is to provide a set of operating guidelines to assist operating personnel in making operational decisions that will best meet the wet weather operating performance goals. The WWOP is also a SPDES requirement for the Alley Creek Combined Sewer Overflow (CSO) Retention Facility (CSO storage facility) as well as for the Tallman Island Water Pollution Control Plant (WPCP) as the CSO storage facility is tributary to the WPCP.

During wet weather events, numerous operational decisions must be made to effectively manage and optimize treatment of wet weather flows and CSOs. This WWOP is intended to provide a basis for consistent wet weather operating practices, and to maximize the utility of the Alley Creek CSO Retention Facility during wet weather conditions. The WWOP provides for a consistent and documentable method of approach for various situations.

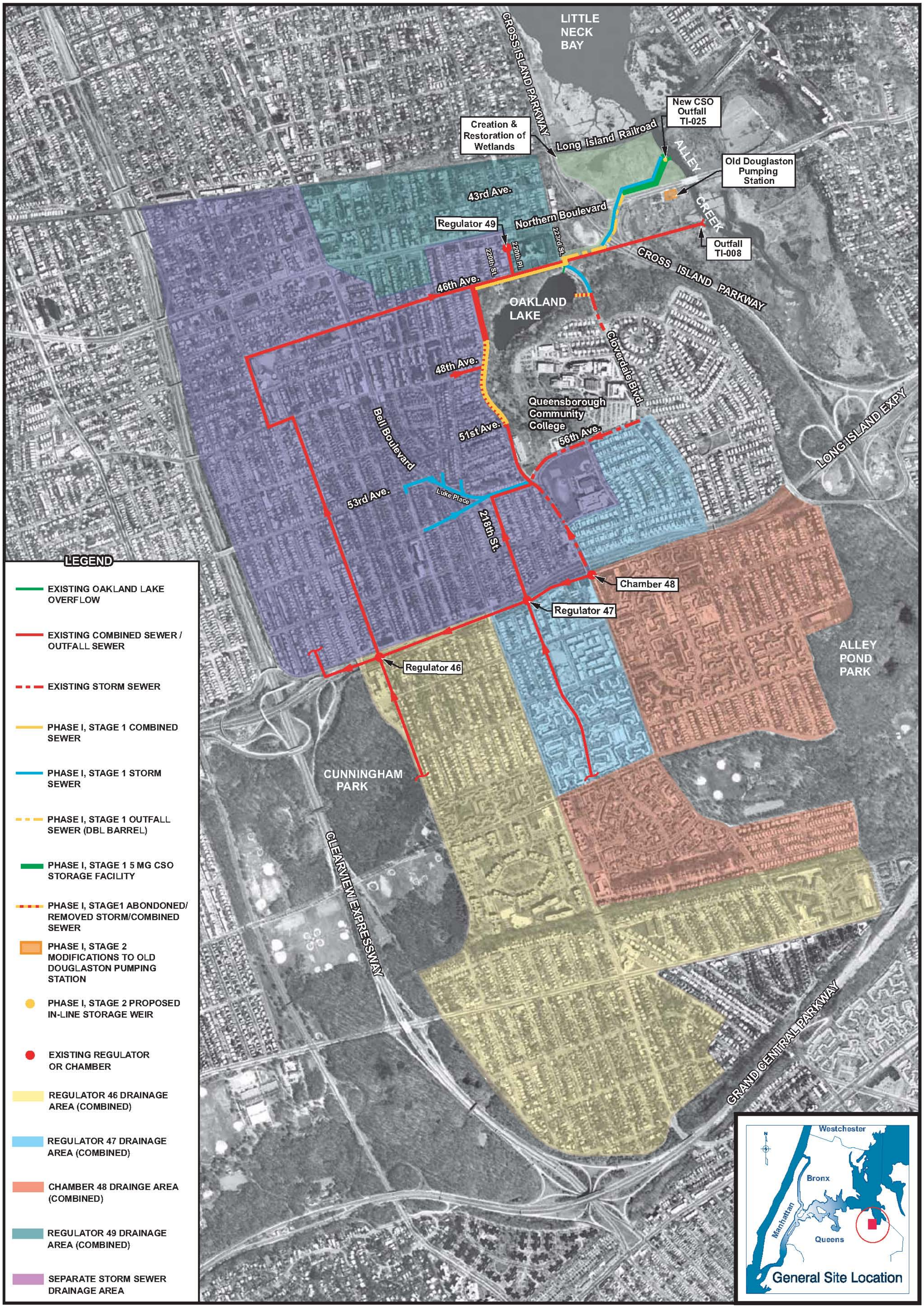
Each rain storm produces a unique combination of flow patterns and facility conditions. Therefore, no plan or manual can provide specific, step-by-step procedures for every possible wet weather scenario. The procedures presented in this WWOP are conceptual in nature, and will be modified as necessary based on experience operating the CSO storage facility.

The construction of the Alley Creek CSO Retention Facility is scheduled to be complete in December 2009.

1.1 Background

The Alley Creek CSO Retention Facility Project has been planned and designed by the New York City Department of Environmental Protection (NYCDEP) to: (1) alleviate surcharging of sewers and subsequent street flooding within areas located immediately west and north of Oakland Ravine and Lake and Alley Park along Springfield Boulevard and 46th and 56th Avenues; and (2) reduce CSOs discharged into Alley Creek through existing Outfall TI-008 (SPDES No. NY0026239), a 10'-0" W x 7'-6" H (inner dimensions) conduit. The Alley Creek CSO Retention Facility is designed as a flow-through retention facility to store and capture up to 5 million gallons (MG) of combined sewage, and return the captured combined sewage to the existing combined sewer system to be conveyed to the Tallman Island WPCP for treatment.

The Alley Creek CSO Retention Facility is being constructed in an area within Alley Park in the Bayside section of Queens, New York, north of Northern Boulevard and across from the Alley Pond Environmental Center. Figure 1-1 shows the site location of the Alley Creek CSO Retention Facility, and the principal elements associated with the facility. The CSO storage facility is being constructed in two stages.



WET WEATHER OPERATING PLAN - ALLEY CREEK

FACILITY SITE LOCATION; FACILITY FEATURES; AND DRAINAGE AREA

FIGURE 1-1

Storage\lorenzo\TI_Schematic plan_8.5x11_6.02.03.ai

The first stage, Stage 1, of the project includes the construction of a new CSO outfall sewer and storage conduit with a combined storage capacity of approximately 5 million gallons (MG), and improvements within the combined sewer system upstream of existing Outfall TI-008. Under Stage 2, a fixed overflow weir will be constructed within the outfall sewer at its downstream end near the new outfall (TI-025), and concrete block walls will be removed to allow flow to discharge over side overflow weirs into the CSO storage conduit constructed along both sides and underneath the new outfall sewer. This additional construction will activate the operation of the CSO storage conduit. The new outfall sewer will also function as part of the CSO storage facility after construction of the fixed overflow weir.

The second stage, Stage 2, of the project includes activation of the 5 MG CSO storage facility, upgrading the Old Douglaston Pumping Station (ODPS) to enhance the station's reliability to pump the captured combined sewage to the combined sewer system for conveyance to the Tallman Island WPCP for treatment, rehabilitation of the Outfall TI-008 structure, and restoration of a 1.51-acre area surrounding Outfall TI-008 to include restoration/creation of wetlands and replacement of invasive vegetation with indigenous plantings as mitigation for the area disturbed as a result of rehabilitation of the outfall structure. As part of Stage 2, an air treatment system will be installed at the ODPS to treat exhaust air from the CSO storage facility, and the wet well and grinder room of the pumping station. The air treatment system will consist of a one-stage, dual-bed carbon adsorption system to reduce hydrogen sulfide concentrations in the inlet air to at least 1 ppb at the nearest sensitive receptor, the Alley Pond Environmental Center. This criterion satisfies the NYCDEP's air quality requirements.

Construction of Stage 2 was initiated in December 2006, with completion of construction scheduled for December 2009.

1.1.1 Drainage Area

Outfall TI-008 discharges to Alley Creek at a location south of Northern Boulevard on the west bank of the Creek. This outfall, which was found to be a significant component of water quality degradation in Alley Creek, consists of a 10'-0" W x 7'-6" H (inner dimensions) outfall sewer serving an overall wet-weather drainage area of approximately 1,975 acres within the Tallman Island WPCP service area. The drainage area of Outfall TI-008 is shown on Figure 1-1. This same drainage area will be served by the new outfall sewer and CSO storage conduit.

1.1.2 Wet Weather Flow Control

The Alley Creek CSO Retention Facility is designed to store and capture approximately 5 MG of combined sewage at a peak design flow of approximately 1,980 cfs or 1,300 million gallons per day (mgd). The new outfall sewer and CSO storage conduit are designed to operate completely passively during wet weather events. Combined sewage volumes in excess of the CSO storage facility capacity of 5 MG will overflow the crest of the fixed weir at the terminus of the new outfall sewer, and discharge to Alley Creek through new Outfall TI-025. During storms which exceed a five-year return period as defined by the NYCDEP, the portion of CSO flow that exceeds the 1,300 mgd hydraulic capacity of the outfall sewer will overflow a fixed weir at a chamber located near the intersection of 223rd Street and Cloverdale Boulevard (Chamber No. 6), and be conveyed through the existing 10'-0" W x 7'-6" H outfall sewer to discharge into Alley Creek through existing Outfall TI-008.

Captured CSO will be drained by gravity to the wet well of the ODPS following wet weather events, provided that there is adequate hydraulic capacity in the Tallman Island WPCP combined sewer system and at the plant. From the ODPS, the captured CSO will be pumped through a new 20-inch diameter force main to the existing combined sewer system for conveyance to the Tallman Island WPCP.

1.1.3 Alley Creek CSO Retention Facility Description

The Alley Creek CSO Retention Facility will provide approximately 5 MG of in-line storage volume to decrease the frequency and severity of CSO discharges to Alley Creek. The hydraulic capacity of the existing Outfall TI-008 outfall sewer, which extends from the intersection of 223rd Street and 46th Avenue through Alley Park south of Northern Boulevard, will be utilized during extreme storm events that exceed the capacity of the proposed structures. During dry and wet weather, the overflow from Oakland Lake will continue to discharge to the existing outfall sewer into Alley Creek through Outfall TI-008, as under existing conditions. CSO entering the CSO storage facility will be captured and stored behind the fixed overflow weir that will be constructed at the terminus of the new outfall sewer.

During dry weather, the overall Alley Creek CSO Retention Facility will drain by gravity to the wet well of the ODPS through a 24-inch diameter sewer that will extend from the facility, cross under Northern Boulevard, and terminate at a new junction chamber that will route the flow into an existing sewer that discharges to the pumping station wet well. The ODPS will pump sanitary sewage and captured CSO into the new 20-inch diameter force main that will terminate in the general vicinity of 46th Avenue and 223rd Street, discharging into the existing Tallman Island WPCP combined sewer system.

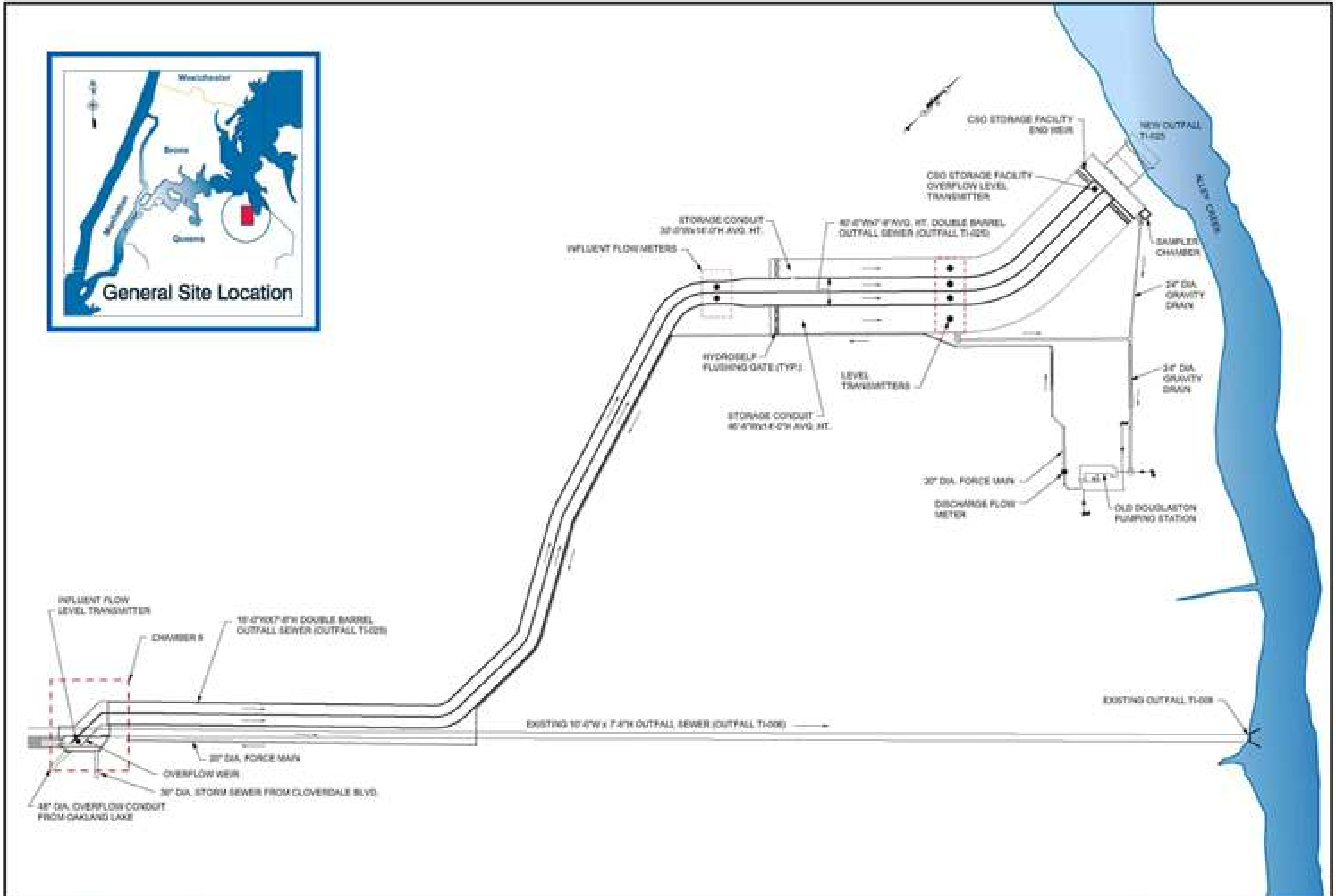
Flow and level monitoring equipment will be installed to allow the determination of the volume of combined sewage that is captured and pumped back to the Tallman Island WPCP, the volume of combined sewage that flows through the CSO storage facility during storms, and the volume of combined sewage that bypasses the storage facility during those storms which generate CSO volumes and flow rates in excess of the CSO storage facility volume and hydraulic capacity. The flow and level monitoring equipment provided will be able to operate over the range of tidal conditions typical for Alley Creek. Figure 1-2 shows a schematic plan of the Alley CSO Retention Facility with flow and level monitoring locations, and Figure 1-3 provides a flow diagram of the facility also with flow and level monitoring locations. Flow and level monitoring locations are as follows:

- Influent Flow Monitoring - CSO storage facility influent flow will be determined by measuring flow velocity and level in the 16'-0" W x 7'-6" H double barrel outfall sewer downstream of Chamber No. 6.
- Facility Overflow (Flow-Through) Monitoring - CSO storage facility flow-through volumes will be determined by registering and totalizing the measured influent flow when flow over the overflow weir located at the terminus of the new outfall sewer begins in combination with the readings at the level transmitter installed at the crest of the weir. When the measured level at the overflow weir decreases to an elevation below the weir crest, registering and totalizing of flow will cease.
- Outfall TI-008 - Influent flow through existing Outfall TI-008 will be determined based on the readings at the level transmitter installed at the crest of the overflow weir in Chamber No. 6. Flow monitoring will be performed only when level monitoring indicates that the overflow weir within Chamber No. 6 has been crested.
- Old Douglaston Pumping Station - The flow of captured CSO pumped back from the wet well through the new 20-inch diameter force main from the ODPS will be monitored and recorded by an ultrasonic flow meter.

A listing of systems/equipment included in the Alley Creek CSO Retention Facility is as follows:

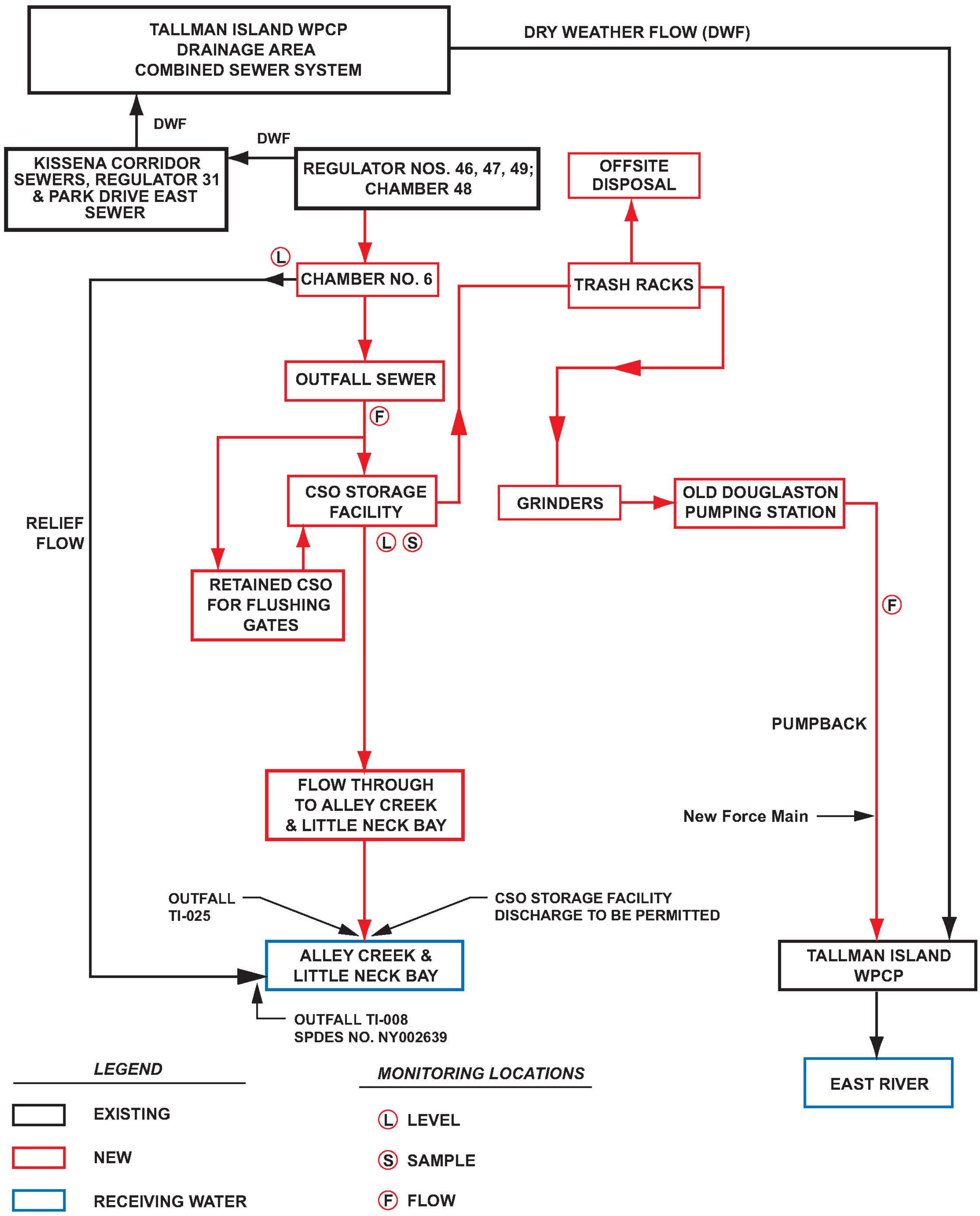
- CSO storage facility sluice gate drainage system;
- CSO storage facility drainage control structure housing the pinch valve;
- CSO storage conduit flushing system;
- CSO storage facility and ODPS air treatment system;
- Two open-channel sewage grinders at influent to ODPS; and
- Four main sewage pumps with pump control discharge cone valves at ODPS.

The operation of the Alley Creek CSO Retention Facility will be coordinated with the operation of the Flushing Bay CSO Retention Facility to ensure that dry-weather overflows are not induced, and that treatment capabilities of the Tallman Island WPCP will not be exceeded during periods of pumping operations. Control of the pumping from the ODPS will be based on flow and level monitoring at key locations within the combined sewer system upstream of the Tallman Island WPCP as well as at the influent to the plant as discussed in Section 2.2.



WET WEATHER OPERATING PLAN - ALLEY CREEK
RETENTION FACILITY SCHEMATIC AND MONITORING LOCATIONS

FIGURE 1-2



WET WEATHER OPERATING PLAN - ALLEY CREEK
CSO RETENTION FACILITY SCHEMATIC FLOW DIAGRAM

FIGURE 1-3

1.2 Performance Goals for Wet Weather Events

The primary goals of the Alley Creek CSO Retention Facility are to reduce the volume of combined sewer overflows into Alley Creek, and improve the water quality of the Creek.

The CSO storage facility is designed to provide 100 percent capture of combined sewage generated by all storms up to about 0.46 inch total precipitation, or approximately 70 percent of the storms that occur on an annual basis in the Outfall TI-008 drainage area. Receiving water computer modeling projections indicate that the overall volume of CSOs discharged to Alley Creek will be reduced by about 54 percent; total suspended solids (TSS) loading will be reduced by about 70 percent; and the biochemical oxygen demand (BOD) loading will be reduced by about 66 percent. In addition, the amount of floatables and settleable solids discharged into Alley Creek will decrease.

1.3 Purpose of this Plan

The purpose of this plan is to provide a set of general operating guidelines to assist the DEP operations staff in making operational decisions for the Alley Creek CSO Retention Facility, which will best meet the performance goals stated in Section 1.2 and the requirements of the SPDES discharge permit.

1.4 Using the Plan

This plan is designed for use as a general reference during wet weather events, and is meant to supplement the Alley Creek CSO Retention Facility operation and maintenance manual. It is broken down into sections that cover operation of the Alley Creek CSO Retention Facility. The following information is included:

- Steps to take before, during and after a wet weather event;
- Discussion of why the recommended control steps are performed;
- Identification of specific circumstances that trigger the recommended changes; and
- Identification of things that can go wrong with the equipment.

This plan is a living document. Users of the plan are encouraged to identify new steps, procedures, and recommendations to further the objectives of the plan. Modifications, which improve upon the plan's procedures, are encouraged. With continued input from the plant's experienced operations staff, this plan will become a useful and effective tool.

2. CSO STORAGE FACILITY OPERATION

This section presents equipment summaries and wet weather operating protocols for the major unit operations of the Alley Creek CSO Retention Facility. The protocols are divided into steps to be followed before, during and after a wet weather event. The protocols also address the basis for the protocol (Why do we do this?), events or observations that trigger the protocol (What triggers the change?), and discussions of what can go wrong. The following information and protocols apply to proposed unit processes. At the time this protocol was being prepared, the Alley Creek CSO Retention Facility was under construction, and is subject to revisions by the time the facility is in operation. These protocols will be revised as appropriate when construction of the CSO storage facility is complete.

2.1 CSO Storage Conduit and Outfall Sewer (CSO Storage Facility)

Before Wet Weather Event

1. Under normal conditions the CSO storage conduit and new outfall sewer will be in service.
2. Check to ensure flow and level monitoring equipment are operational.
3. Make sure that the sluice gates for the drain lines to the ODPS are completely closed.
4. Check that tide gates at Outfall TI-025 are sealed completely.

During Wet Weather Event

1. Check water surface elevations at the overflow weirs for flooding and flow imbalances.

After Wet Weather Event

1. Open sluice gates for the drain lines to the ODPS to allow combined sewage from the storage conduit and the outfall sewer to drain into the ODPS wet well for conveyance to the Tallman Island WPCP for treatment.

2 Initiate CSO storage facility pumpback/cleaning sequence as appropriate.

3 Clean the overflow weirs if needed.

4 Repair any malfunctioning operations or equipment out of service.

5 Remove floating debris retained in the storage conduit and outfall sewer

The CSO storage facility pumpback sequence is initiated manually by an operator at the Tallman Island WPCP; however, once initiated the pumpback sequence will continue automatically until completion. The CSO storage conduit cleaning sequence is part of the overall pumpback sequence. Following is a generalized description of the pumpback/cleaning sequence:

1. An operator at the Tallman Island WPCP manually initiates the CSO storage facility pumpback sequence following a wet weather event.

2. The water levels within the CSO storage conduit flushing water storage areas are automatically checked as part of the CSO pumpback sequence. If supplemental flushing (cleaning) water is needed, this supplemental water is delivered to the respective flushing water storage area through the flushing water feed system, which draws stored combined sewage from the outfall sewer located above the CSO storage conduit.

3. Once the flushing water storage areas are confirmed to be filled, drainage of the CSO storage conduit cells to the ODPS commences.

4. Upon completion of the drainage of the CSO storage conduit, and as selected by the operator at the Tallman Island WPCP, one or more sequences of the CSO storage conduit flushing system are automatically run to wash the invert of the CSO storage conduit cells.

5. Upon completion of the CSO storage conduit flushing system sequence, drainage of the CSO outfall sewer to the ODPS commences.

6. When the pumpback sequence is complete, all equipment is automatically returned to their respective pre-operation positions.

During the draining of the CSO storage facility and the pumpback sequence, there are two means of floatables control for the facility as follows:

1. Two trash racks are provided, each with 6-inch clear spacing between the bars. The first rack is located in Chamber No. 1 upstream of the sluice gate that drains the CSO storage conduit cells, and the second rack is located in Chamber No. 2 upstream of the sluice gate that drains the CSO outfall sewer. The trash racks are provided to protect the sluice gates and downstream pinch valve from damage by any large objects that may be collected within the CSO storage facility. Debris collected behind the trash racks will be removed manually.
2. A new underground structure has been added upstream of the wet well for the ODPS, which will house two open-channel sewage grinders. All flow (sanitary and combined) will pass through these grinders prior to entering the wet well and being

pumped out to the combined sewer system for conveyance to the Tallman Island WPCP.

Why Do We Do This?

Combined sewage flows and levels need to be monitored in the CSO storage conduit and outfall sewer for the following reasons:

1. Prevent premature overflow weir flooding and discharge into Alley Creek.

2. Prevent short circuiting.

3. Prevent excessive sludge and grit accumulation.

4. Prevent dry-weather discharges during facility pumpback and cleaning sequences.

What Triggers The Change?

Wet weather events above a certain intensity will cause CSO discharges from the regulators serving the Outfall TI-008 drainage area, Regulators TI-R46, TI-R47, and TI-R49. The Alley Creek CSO Retention Facility is designed to reduce the frequency and severity of CSO discharges into Alley Creek during rain events. During dry weather events, the CSO storage facility will drain to the ODPS wet well for conveyance to the Tallman Island WPCP for treatment.

What Can Go Wrong?

Despite potential failures in flow, level, and sediment control equipment, the Alley Creek CSO Retention Facility is designed to allow the passive storage and capture of combined sewage during wet weather events. During intense storms, the water surface in the new outfall sewer and CSO storage conduit can rise above the crest of the fixed overflow weir at the downstream end of the new outfall sewer and discharge into Alley Creek. In addition, combined sewage can also be relieved via Chamber No. 6 to discharge to Alley Creek though Outfall TI-008 during extreme wet weather events.

2.2 CSO Pumping – Old Douglaston Pumping Station

The ODPS will be modified to accept flow drained from the CSO storage facility. After storms, during dry-weather conditions, when there is available hydraulic capacity in the existing combined sewer system and at the Tallman Island WPCP, the outfall sewer and CSO storage conduit will be drained to the wet well of the pumping station.

Flow and level monitoring equipment will be installed to allow the determination of the volume of combined sewage that is captured and pumped back to the Tallman Island WPCP, the volume of combined sewage that flows through the CSO storage facility during storms, and the volume of combined sewage that bypasses the storage facility during those storms which generate CSO volumes and flow rates in excess of the CSO storage facility volume and hydraulic capacity. The flow and level monitoring equipment provided will be able to operate over the range of tidal conditions typical for Alley Creek. Figure 1-2 shows a schematic plan of the Alley CSO Retention Facility with flow and level monitoring locations as follows:

- Influent Flow Monitoring - CSO storage facility influent flow will be determined by measuring flow velocity and level in the 16'-0" W x 7'-6" H double barrel outfall sewer downstream of Chamber No. 6.
- Facility Overflow (Flow-Through) Monitoring - CSO storage facility flow-through volumes will be determined by registering and totalizing the measured influent flow when flow over the overflow weir located at the terminus of the new outfall sewer begins in combination with the readings at the level transmitter installed at the crest of the weir. When the measured level at the overflow weir decreases to an elevation below the weir crest, registering and totalizing of flow will cease.
- Outfall TI-008 - Influent flow through existing Outfall TI-008 will be determined based on the readings at the level transmitter installed at the crest of the overflow weir in Chamber No. 6. Flow monitoring will be performed only when level monitoring indicates that the overflow weir within Chamber No. 6 has been crested.
- Old Douglaston Pumping Station - The flow of captured CSO pumped back from the wet well through the new 20-inch diameter force main from the ODPS will be monitored and recorded by an ultrasonic flow meter.

The ODPS will have a capacity of approximately 8.5 mgd after it is modified. Given the average dry-weather flow for the pumping station drainage area, the pumping station will have the capacity, approximately 3.3 mgd, to pump out the Alley Creek CSO Retention Facility in approximately 36 hours.

The operation of the Alley Creek CSO Retention Facility will be coordinated with the operation of the Flushing Bay CSO Retention Facility to ensure that dry-weather overflows are not induced, and that the treatment capabilities of the Tallman Island WPCP will not be exceeded during periods of pumping operations. The actual rate of pumping from the ODPS at any time will depend on the available hydraulic capacity of the Flushing Interceptor, and the available hydraulic and treatment capacity of the Tallman Island WPCP. By coordinating pumping rates with the available capacities in the Flushing Interceptor and the Tallman Island WPCP, dry-weather overflows will not be induced, and the WPCP will meet its SPDES permit limits.

In conjunction with the pumping rate from the Flushing Bay CSO Retention Facility, the control of the pumping rate from the ODPS will be based on flow meter readings located at the influent to the Tallman Island WPCP and on level transmitter readings located at the following two locations along the Flushing Interceptor, with all measuring and monitoring functions being performed automatically:

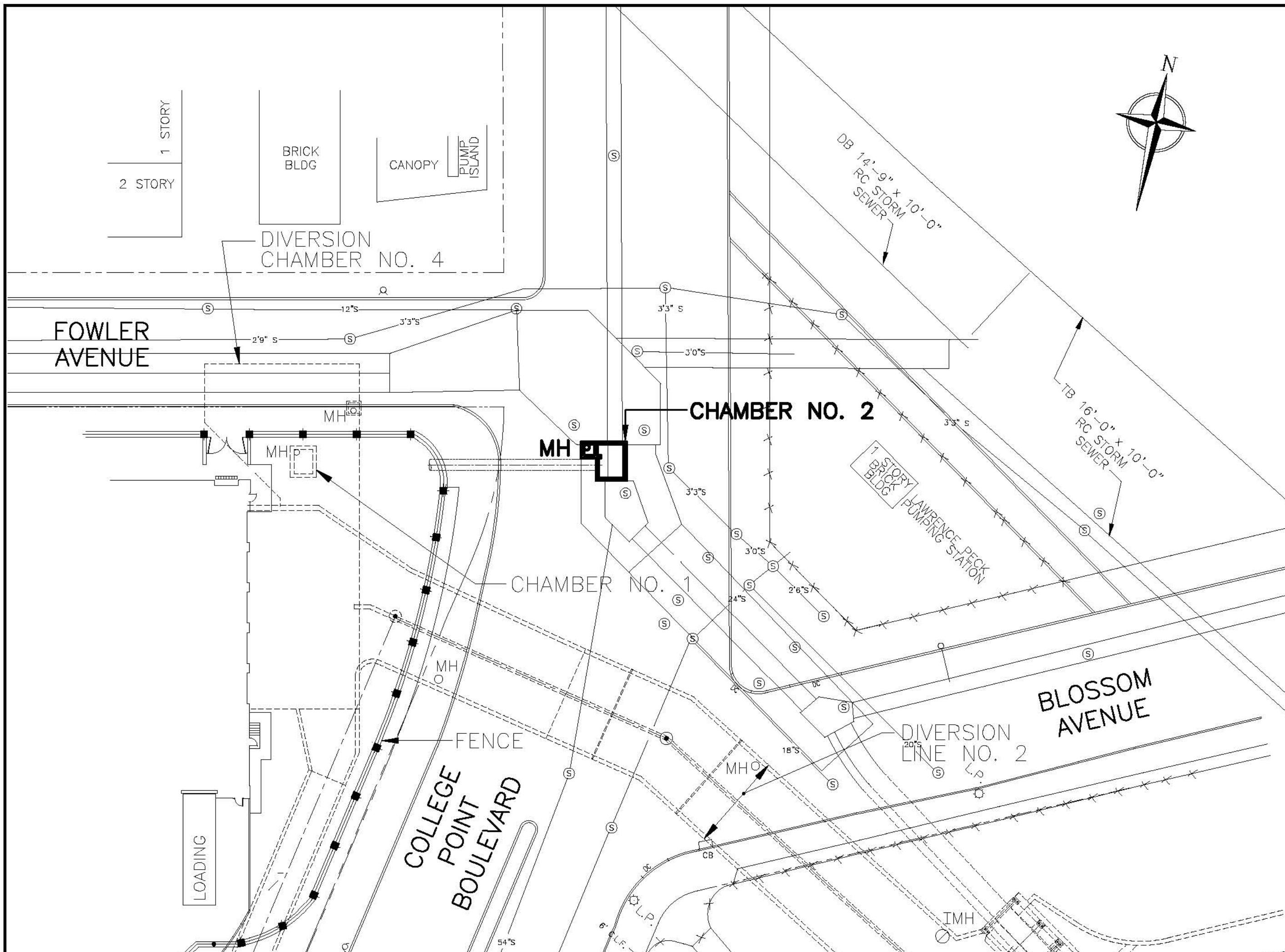
- Chamber No. 2 located at the intersection of College Point Boulevard and Fowler Avenue, Flushing, NY, as shown on Figure 2-1; and
- Regulator No. 9 located at the intersection of Linden Place and 32nd Avenue, Flushing, NY, as shown on Figure 2-2.

The combined pumping rates from the Alley Creek CSO Retention Faciilty and the Flushing Bay CSO Retention Facility, during the pumpback sequence will be controlled so that the flow at the influent to the Tallman Island WPCP does not exceed 80 mgd, the flow in the Flushing Interceptor at Chamber No. 2 does not exceed 58 mgd, and the flow in the Flushing Interceptor at Regulator No. 9 does not exceed 65 mgd.

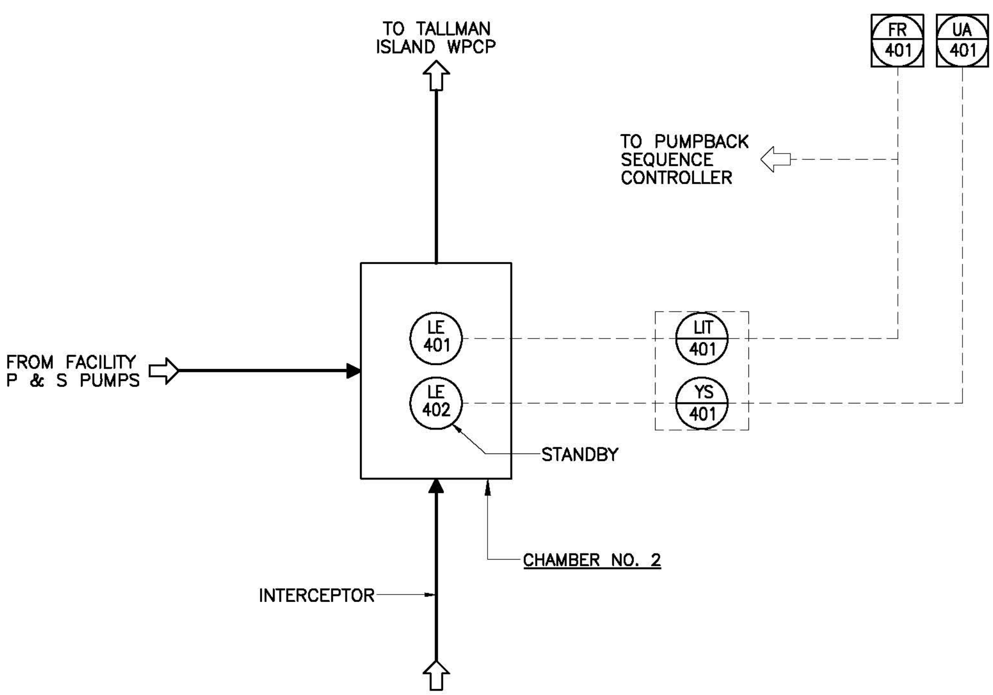
An operator at the Tallman Island WPCP will be responsible for monitoring flow at the influent to the WPCP and water levels in Chamber No. 2 and Regulator No. 9. As discussed in Section 2.1, an operator at the WPCP will manually initiate the pumpback sequence for the Alley Creek CSO Retention Facility, and will also have manual override capability of terminating the pumpback sequence if it becomes necessary due to flows/levels exceeding preset limits at any of the three key monitoring locations. Once the pumpback sequence for the Alley Creek CSO Retention Facility is initiated, the CSO storage facility will begin draining, and the ODPS will begin pumping at a constant rate of approximately 8.5 mgd. The flow/level monitoring system at the influent to the Tallman Island WPCP and within the Flushing Interceptor will detect this additional flow from the Alley Creek CSO Retention Facility, and send a signal to the pumpback system for the Flushing Bay CSO Retention Facility. This signal will be processed by the pumpback system's variable frequency drives, and the pumpback rate for the Flushing Bay CSO Retention Facility will be automatically adjusted to ensure that the preset flows/levels are not exceeded at the influent to the Tallman Island WPCP, at Chamber No. 2, or at Regulator No. 9.

In addition to the flow meters and level transmitters located at the three key monitoring locations indicated above, flow meters will be installed within the Junction Chamber of the Flushing and Whitestone Interceptors located at the intersection of 11th Avenue and 130th Street, College Point, NY as shown on Figure 2-2. The purpose for these flow meters is to collect flow data to be used for future planning of facilities within the combined sewer system tributary to the Tallman Island WPCP.

Furthermore, in addition to the on-site pumpback sequence monitoring locations at the ODPS and at the Flushing Bay CSO Retention Facility, as well as the two locations at the Tallman Island WPCP, provisions will also be provided for monitoring the progress of the Alley Creek CSO Retention Facility pumpback sequence at the Avenue V Pumping Station Crew Quarters, Brooklyn, NY.



LOCATION PLAN

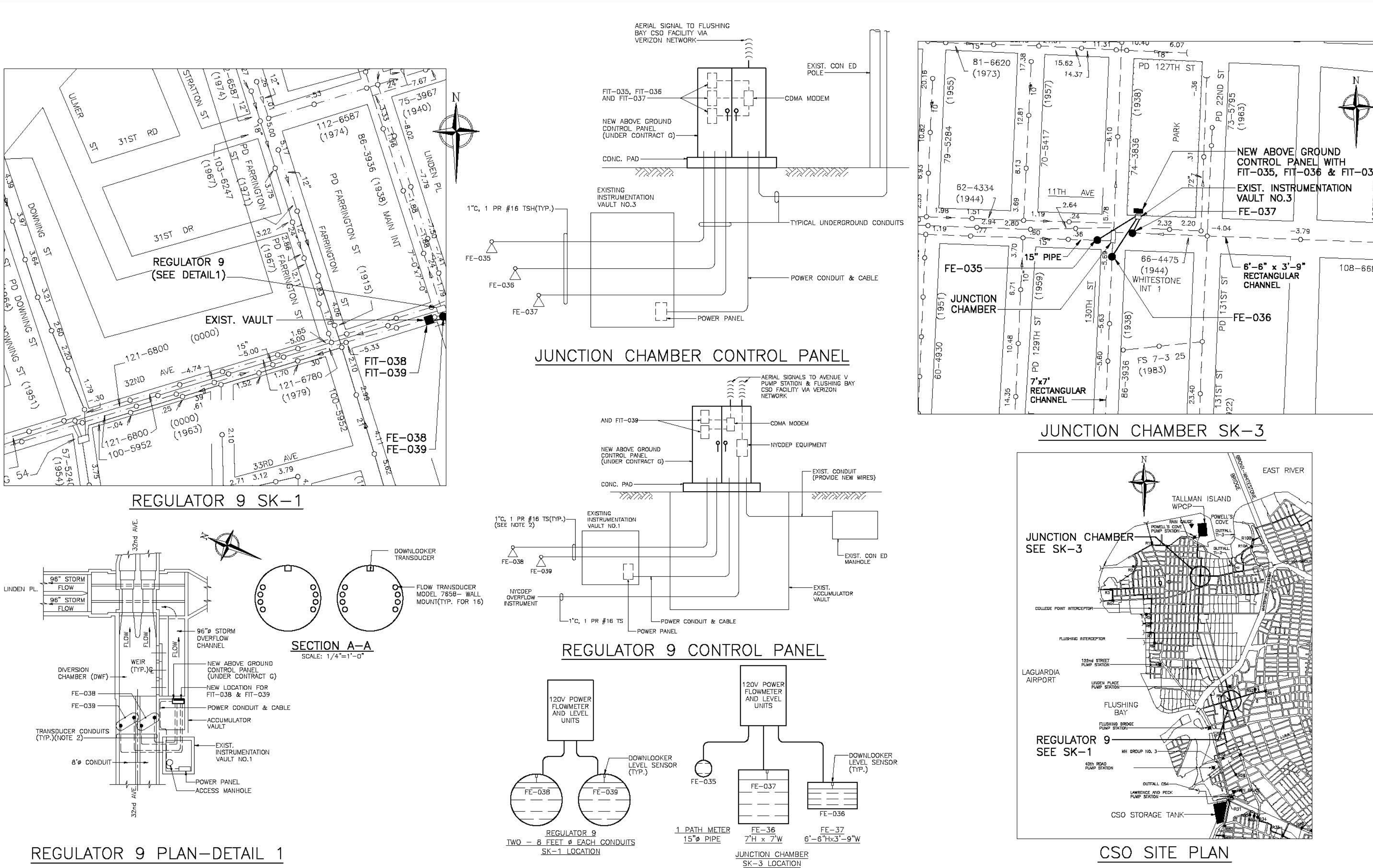


NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION DEP

WET WEATHER OPERATING PLAN – ALLEY CREEK
CHAMBER NO. 2
LOCATION PLAN AND SCHEMATIC

FIGURE 2–1

Time: 2:48 P.M. Date: 10/10/2007 joe_pizappi Drawing File: H:\32159\WWOP\FIGURES\FIGURE 2-2.dwg



WET WEATHER OPERATING PLAN-ALLEY CREEK
REGULATOR NO. 9 AND JUNCTION CHAMBER
LOCATION PLANS, SCHEMATICS AND DETAILS

FIGURE 2-2

Before Wet Weather Event

1. Check that pumps and sewage grinders at the ODPS are in working order.
1. Check that wet well monitors at the ODPS are functional.
2. Check that sluice gates for the drain lines to the ODPS from the outfall sewer and CSO storage conduit are closed.

During Wet Weather Event

2. Continue to cycle pumps at the ODPS to ensure that all available pumps are in working order.
3. Check that wet well monitors at the ODPS are functional.
4. Monitor water level in the CSO storage conduit.

After Wet Weather Event

1. Open sluice gates for the drain lines to the ODPS to allow combined sewage from the CSO storage conduit and the outfall sewer to drain into the ODPS wet well for conveyance to the Tallman Island WPCP for treatment.
2. Adjust number of pumps in operation at the ODPS so as to maintain safe water levels in the ODPS wet well and the Flushing Interceptor.

Why Do We Do This?

The pump operating strategy after wet weather events is to maintain a safe water level in the ODPS wet well and to prevent dry-weather overflows. This is accomplished by using a pinch valve to control the combined sewage flow draining from the CSO storage facility, and monitoring the available hydraulic capacity in the Flushing Interceptor located upstream of the Tallman Island WPCP and at the Tallman Island WPCP.

What Triggers The Change?

The number of pumps online at the ODPS, and the operation of the pinch valve used to control the draining of the CSO storage facility are controlled by the ODPS wet well water level, the available capacity within the Flushing Interceptor located upstream of the Tallman Island WPCP, the available capacity of the Tallman Island WPCP, and pumping operations at the Flushing Bay CSO Retention Facility.

If any one of the following events occurs, the sluice gates located at the Alley Creek CSO Retention Facility will shut down and will not allow additional CSO to drain to the ODPS:

- The sanitary sewer interceptor that drains from the east into the ODPS has surcharged.

- The Main Interceptor that discharges to the Tallman Island WPCP has surcharged.

- The Whitestone Interceptor has surcharged, i.e. the water surface level at Regulator No. 10 is unacceptably high.

- A dry weather bypass may be induced at Regulator No. 9. A high water level within the regulator has been reached.

- The Tallman Island WPCP has reached its hydraulic design capacity.

- The ODPS is unable to handle the existing flow; the high water alarm in the wet well is activated.

What Can Go Wrong?

If the sluice gates, pinch valve and pumps are not operating properly, water levels in the wet well at the ODPS will vary significantly and flooding could occur. System monitoring instrumentation may fail or give false, misleading readings. Uncontrolled or excessive pumping could induce dry-weather overflows at downstream regulators and sewer surcharging.

2.3 Hydroself Flushing Gates

Hydroself Flushing Gates will be provided to flush and clean settled solids and debris from the invert of the CSO storage conduit. The Hydroself Flushing Gates will use the combined sewage captured during rainstorms. Each gate will be equipped with its own hydraulic operator; and the gates will be activated one at a time.

Before Wet Weather Event

- Make sure flushing gates are locked in the closed position.

- Make sure all instruments are operational.

During Wet Weather Event

- Make sure flushing gates remain in the closed position.

- Make sure all instruments are operational.

After Wet Weather Event

- Initiate CSO storage facility draining, cleaning and pumping operations sequence.

- Make sure that flushing gates are properly reseated and locked in the closed position.

Why Do We Do This?

Proper functioning and operation of the Hydroself Flushing Gates is necessary for the proper cleaning of the CSO storage conduit. Proper cleaning of the CSO storage conduit is necessary to prevent the build-up of solids that could cause undesirable odors, and diminish the volumetric capacity of the CSO storage facility.

What Triggers The Change?

The onset of a wet weather event of sufficient magnitude will cause the overflow of the regulators in the Outfall TI-008 drainage area, and the CSO storage facility will collect and store combined sewage. This will also cause the reservoirs behind the Hydroself Flushing Gates to fill. After the wet weather event is over, the stored combined sewage will be used to flush the CSO storage conduit.

What Can Go Wrong?

The Hydroself Flushing Gates can become inoperative, or get stuck in either the open or closed positions. These conditions will not allow for the collection of water for flushing purposes during a wet weather event, or allow for proper cleaning of the CSO storage conduit following a wet weather event.

2.4 Air Treatment System

The Alley Creek CSO Retention Facility will be provided with an air treatment system to ensure the elimination of nuisance odors at nearby sensitive receptors. The nearest sensitive receptor is the Alley Pond Environmental Center located on Northern Boulevard adjoining the property line of the ODPS. The air treatment system will consist of a one-stage, dual-bed carbon adsorption system to reduce hydrogen sulfide concentrations in the inlet air from the CSO storage facility, and the wet well and grinder room of the pumping station to at least 1 ppb at the Alley Pond Environmental Center. This criterion satisfies the NYCDEP's air quality requirements.

Before, During and After Wet Weather Events

The air treatment system operates in a continuous manner, regardless of whether it is before, during or after a wet weather event. The dampers for the air treatment system are balanced to draw the desired amount of odorous air from the CSO storage facility and the wet well and grinder room of the ODPS, and remain in their positions on a continuous basis, unless an emergency condition arises.

Why Do We Do This?

Proper functioning and operation of the air treatment system is necessary to treat odorous air that is generated by operation of the CSO storage facility and/or the ODPS.

What Triggers the Change?

The air treatment system operates in a continuous manner, regardless of whether it is before, during or after a wet weather event. There is no difference between the operations strategy during dry weather and during wet weather.

What Can Go Wrong?

Possible emergency situations and how they are handled are described below:

- Should smoke be detected within the influent ductwork, the system blower will automatically shut down and an alarm will be sent to all monitoring stations. These monitoring stations are located at the ODPS, Alley Creek CSO Retention Facility, Flushing Bay CSO Retention Facility, Tallman Island WPCP, and Avenue V Pumping Station Crew Quarters.

- If the preset value of the differential pressure between the inlet and the outlet of the air treatment system is exceeded, the system blower will automatically shut down and an alarm will be sent to all monitoring stations.

- If the temperature within either of the carbon beds exceeds the preset value, the system blower will automatically shut down and an alarm will be sent to all monitoring stations.

2.5 Permit Monitoring

During the first two years that follow completion of construction of the Alley Creek CSO Retention Facility and final acceptance of Alley Creek Contract ER-AC2, velocity, level and rainfall data will be collected and used to calibrate a hydraulic model of the CSO storage facility tributary combined sewer system and the CSO storage facility. At the end of the two-year monitoring period, the final calibrated hydraulic model, in conjunction with collected rainfall data, will be used to determine the volume of combined sewage that discharges into Alley Creek through new Outfall TI-025 and through existing Outfall TI-008. The equipment to be used for data collection will be installed under Contract ER-AC2 with the locations and types of equipment as follows:

<u>Measurement of CSO Through Outfall TI-025</u>

- Level transmitter installed over the crest of the fixed overflow weir, located at the downstream end of the new outfall sewer.

- Flow meters located within the limits of the outfall sewer, upstream of the fixed overflow weir.

Measurement of CSO Through Outfall TI-008

- Level transmitter located over the crest of the overflow weir, within Chamber No. 6.

Measurement of Stored Volume within the CSO Storage Facility

- CSO Outfall Sewer - Two level transmitters; one located within the northern barrel, and one located within the southern barrel of the outfall sewer.

- CSO Storage Conduit - Two level transmitters; one located within the northern section of the storage conduit, and one located within the southern section of the storage conduit.

Rainfall Measurement

- Rain gauge located within the secure fenced-in area of the ODPS.

This equipment will all be removed at the completion of the two-year monitoring period, with the exception of: the rain gauge, which provides the input rainfall data for the hydraulic model; and the four level transmitters within the CSO outfall sewer and CSO storage conduit, which provide the data necessary for the calculation of the stored volume of CSO.

APPENDIX B

FLUSHING BAY CSO RETENTION FACILITY WWOP

Flushing Bay CSO Retention Facility

Queens, New York

Wet Weather Operating Plan

Prepared for:

The New York City Department of Environmental Protection

Bureau of Engineering, Design and Construction (BEDC)

Prepared By:

URS Corporation

Paramus, New Jersey

June 2003

(Revised December 2003)

(Revised April 2007)

(Revised October 2007)

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APPENDICES

1. INTRODUCTION

The purpose of a wet weather operating plan (WWOP) is to provide a set of operating guidelines to assist personnel in making operational decisions that will best meet the wet weather operating performance goals. The WWOP is also a SPDES requirement for the Flushing Bay CSO Retention Facility as well as for the Tallman Island Water Pollution Control Plant (TI WPCP).

During wet weather events, numerous operational decisions must be made to effectively manage and optimize treatment of wet weather flows and CSOs. This WWOP is intended to provide a basis for consistent wet weather operating practices, and to maximize the utility of the Flushing Bay CSO Retention Facility during wet weather conditions.

Each rain storm produces a unique combination of flow patterns and Facility conditions. Therefore, no plan or manual can provide specific, step-by-step procedures for every possible wet weather scenario. The procedures presented in this WWOP are preliminary in nature, and will be refined as necessary based upon operating experience. However, the WWOP can provide a consistent method of approach for various situations.

The construction of the Flushing Bay CSO Retention Facility has been substantially completed and the Facility is operational as of May 17, 2007.

1.1 BACKGROUND

The Flushing Bay CSO Retention Facility, is a 43.4 million gallon (MG) storage Facility with flow-through capacity. The Facility is comprised of a 28.4 MG CSO storage tank, and a 15 MG in-line storage component. The Flushing Bay CSO Retention Facility is designed to capture and store the combined sewage that normally overflows to Outfall No. TI-010, an 18'-6" W x 10'-0" H (inner dimensions) triple barrel (TB) conduit. New diversion structures and influent conduits constructed as part of the overall facilities will convey CSOs into the storage tank. The Facility design flow is 316 MGD with a peak flow of 1,400 MGD.

The CSO storage tank is located below-grade at the Avery Avenue Ballfields in Flushing Meadow - Corona Park in the Borough of Queens, New York City in a triangular area bounded by Fowler Avenue on the north, College Point Boulevard on the East, and the Van Wyck Expressway on the West. Figure 1-1 shows the project site location for the Flushing Bay CSO Retention Facility.

The Flushing Bay CSO Retention Facility Tank is comprised of two (2) “trains” of storage cells in a parallel arrangement; there are a total of fifteen (15) storage cells. Storage cells Nos. 1 through 7 comprise the north train; cells Nos. 8 through 15 comprise the south train.

WET WEATHER OPERATING PLAN - FLUSHING BAY
SITE LOCATION

FIGURE 1-1

During rain events, the Diversion Chambers will divert the CSO to the facility five (5) influent channels. Each influent channel is provided with mechanically cleaned bar screens. The screened flow is routed to the two trains which supply CSO to the North and South side storage cells. In case the incoming flow exceeds the capacity of the storage tank, the additional flow will overflow the Storage Cells Nos 7 and 15 effluent weirs and discharge into the effluent channel. The effluent channel is equipped with tide gates to protect the storage tank against high tide. The effluent channel is connected to the existing Fowler Avenue TB (12'-6" W x 10'-0"H) CSO line. The Fowler Avenue and the Avery Avenue CSO lines combine at a mixing chamber to form a TB CSO (18'-6" W x 10'-0"H) which in turn discharges to Flushing Bay through Outfall TI-010. This TB CSO outfall is also equipped with tide gates.

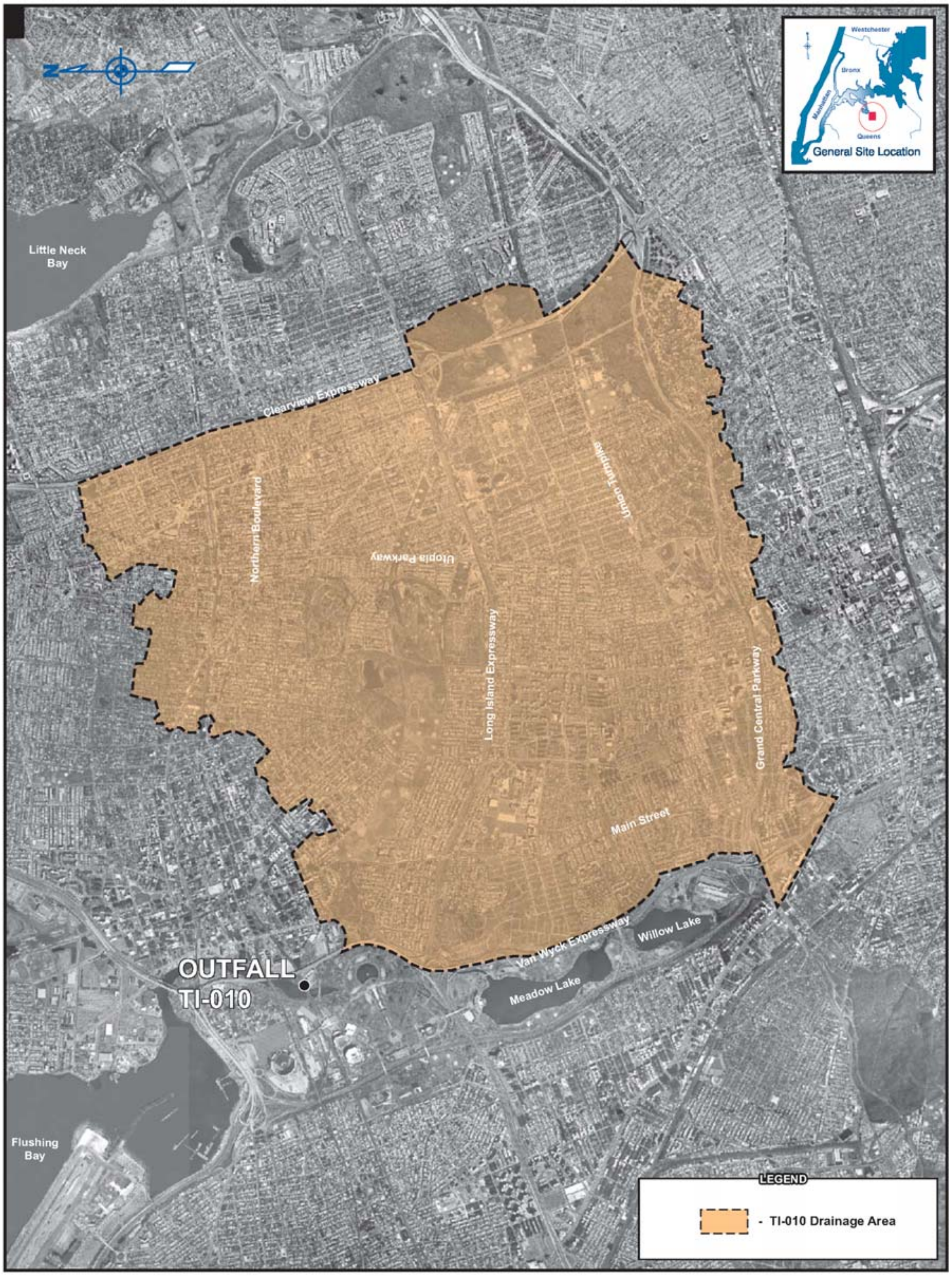
After storms, the CSO stored in the storage tank and the combined sewer system (in-line storage) will drain by gravity to the Primary wet well. The drained CSO into the Primary wet well will then be pumped to the Flushing Interceptor for conveyance to the TI WPCP for treatment. The Facility is also designed to collect dry weather infiltration into the secondary wet well and subsequently pump it to the Flushing Interceptor on a continuous basis during dry weather.

The Facility has been designed to achieve approximately one hundred percent CSO capture for approximately 90 percent of the rainstorms that occur in New York City on an average annual basis. At peak flow, with the storage tank initially empty, up to a one-month return period storm can be fully captured in the Flushing Bay CSO Retention Facility. During storms that generate CSOs in excess of the volumetric capacity of the retention Facility, combined sewage will flow through the CSO storage tank, undergo a degree of sedimentation, and discharge to Flushing Bay through Outfall TI-010. During infrequent, intense storms, portions of the CSOs will overflow the diversion/bypass weirs, bypass the storage tank, and discharge to Flushing Bay through Outfall TI-010.

The multiple overflow consisting of retention tank overflow weirs, and an influent channel side overflow relief weir can convey peak storm flows of about 1,400 MGD through the CSO storage tank (10-month return period storm; tank empty at onset of storm), and bypass about 590 MGD to Outfall TI-010 (10-month return period storm; tank empty at onset of storm).

1.1.1 Drainage Area

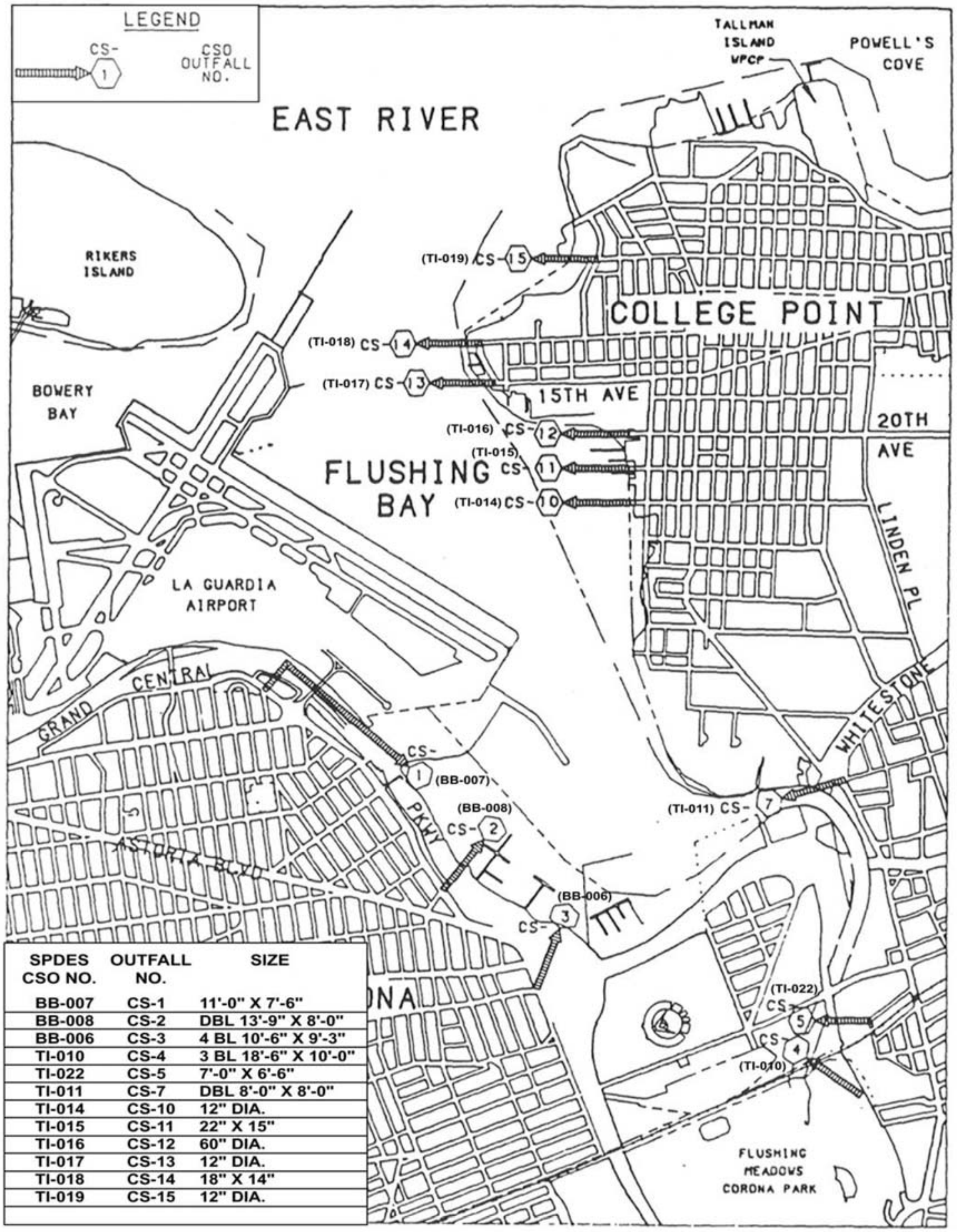
The outfall TI-010 drainage area consists of 7,400 acres of north central Queens within the TI WPCP service area, and discharges to the upstream end of Flushing Bay. Sewers originating at different sections of the drainage area as storm sewers, collect and carry storm water from catch basins and inlets. However, in this system, these storm sewers also carry combined sewage discharged as Combined Sewer Overflows (CSO) from upstream regulators during wet weather. Outfall TI-010 contributes approximately 60 percent of the total CSO discharge and pollutant loading to Flushing Bay. The drainage area tributary to outfall TI-010 is shown on Figure 1-2. The locations of outfalls discharging into Flushing Bay are shown in Figure 1-3.



WET WEATHER OPERATING PLAN - FLUSHING BAY

OUTFALL TI-010 DRAINAGE AREA

FIGURE 1-2



SPDES CSO NO.	OUTFALL NO.	SIZE
BB-007	CS-1	11'-0" X 7'-6"
BB-008	CS-2	DBL 13'-9" X 8'-0"
BB-006	CS-3	4 BL 10'-6" X 9'-3"
TI-010	CS-4	3 BL 18'-6" X 10'-0"
TI-022	CS-5	7'-0" X 6'-6"
TI-011	CS-7	DBL 8'-0" X 8'-0"
TI-014	CS-10	12" DIA.
TI-015	CS-11	22" X 15"
TI-016	CS-12	60" DIA.
TI-017	CS-13	12" DIA.
TI-018	CS-14	18" X 14"
TI-019	CS-15	12" DIA.

WET WEATHER OPERATING PLAN - FLUSHING BAY

OUFALL LOCATIONS

FIGURE 1-3

1.1.2 Facility Wet Weather Flow Control Description

During wet weather events, combined sewage from the Kissena Corridor and Park Drive East storm sewers, and overflow from Regulator 31 will be diverted into the Screening Area of the retention Facility through a diversion structure. The Screening Area is equipped with five (5) Influent Sluice Gates; five (5) Mechanical Bar Screens; one (1) Collecting Belt Conveyor; one (1) Reversing Belt Conveyor; ten (10) 1–CY Self–Dumping Containers; two (2) 30–CY Roll–off Containers; influent level and flow measuring devices and Gas Detection Equipment. The Screening Area is also equipped with Four (4) Influent Channel Sluice Gates that control the flow to the storage cells.

Diversion weirs constructed across the CSO lines are 7 ft high providing 3 ft clearance to the crown of the CSO line and will allow relief of flows in excess of the Facility hydraulic capacity to discharge to the existing CSO conduits that presently convey combined sewage to Outfall TI-010. Relief flow will only be discharged over the diversion weirs during infrequent, intense storms otherwise the CSO shall be continuously diverted to the Facility. The overflow weir at the Influent Channel is approximately 100 feet long; the relief weir located in Diversion Chamber No. 2 is approximately 10 feet long; the relief weir located in the Bulkhead Chamber is approximately 48 feet long.

The Bulkhead Chamber consists of three (3) 16’Wx7’H slide gates installed in each CSO line. Normally, these gates will act as a weir to divert the CSO into the Facility. In case the storage cells are filled and the water surface rises beyond the set point, at EL. 8.00±, the gates shall open to permit unobstructed flow conditions through the CSO line.

The influent flow first passes through five motor operated influent sluice gates. After passing through the sluice gates, the combined sewage will flow through five (5) mechanically cleaned climber-type, single front raked bar screens. The mechanical bar screens will remove any solids larger than 1.25" which have passed through the bar racks, and provide additional protection for other downstream equipment, especially the pumps used for emptying the retention Facility after rainstorms.

After passing through the mechanical bar screens, the combined sewage will flow to the storage tank through two influent channels, Influent Channel Nos. 1 and 2. Influent Channel No. 1 routes flow to tank cell Nos. 1 through 7; Influent Channel No. 2 routes flow to tank cell Nos. 8 through 15. Flow to the two influent channels is regulated by four motor operated sluice gates. Each influent channel is served by two gates.

Solids collected on the mechanical bar screens will be raked off and discharged onto a longitudinal belt conveyor. The longitudinal belt conveyor will discharge the screenings onto a bidirectional cross belt conveyor, which can discharge the collected solids to either of two 30 cubic yard dumpsters. In the event that either belt conveyor is inoperable, mechanical arrangements have been provided to allow each mechanical bar screen to discharge solids into a 1 cubic yard wheeled container. After storms, stored CSO will be pumped to the Flushing Interceptor which conveys flow to the TI WPCP. The storage cells will be automatically washed down with stored strained CSO after each storm. The air from the tank, screenings and wet well areas will be treated using wet scrubbers before being exhausted.

The Facility Monitoring and Control System (FMCS) consists of distributed Programmable Logic Controllers (PLC) based system with local Input/Output (I/O) located in the process dedicated control panels. The distributed PLCs are networked with the Operator Interface Computer Stations located in the Facility Main Control Room and in the TI WPCP Control Room. In general, automatic control functions shall be implemented in software at the Programmable Logic Controllers (PLC) level located in associated Control Panels (CP).

For "normal operation", Facility operators have the ability to start and stop equipment, open and close valves, and adjust process set points and other tuning parameters from the Operator Interface Computer Station (OICS) located in the Main Control Room, and selectively in the TI WPCP. Local Control Stations (LCS) at the equipment will be provided for maintenance purposes only, and are not intended to be used during normal operation.

1.1.3 Flushing Bay CSO Retention Facility Description

The Flushing Bay CSO Retention Facility is provided with a pumping station to pump out captured combined sewage to the 78” Flushing Interceptor, where it is conveyed to the TI WPCP after rainstorms. The pumping station is also designed to pump dry weather infiltration and inflow influent to the tank from the Kissena Corridor to the Flushing Interceptor on a continuous basis during dry weather.

The Pumping Station is provided with a wet well that is divided into two sections, the primary wet well, and the secondary wet well. A weir wall separates the two sections of the wet well. The primary wet well is 27’ wide and 54'–6” long; its bottom elevation is -45.00. The secondary wet well is 27’ wide and 18’–6” long with a bottom elevation of -49.00.

The wet well is filled when pumping operations (Pumpback) are initiated after rainstorms, provided that treatment capacity is available at the TI WPCP and conveyance capacity is available in the Flushing Interceptor. The wet well is filled by draining the tank storage cells by opening the cell drain valves. Captured combined sewage is drained from the cells and conveyed to the wet well through a 48” diameter drain line. This drain line terminates at the southeastern corner of the wet well. Flow discharges from the drain line into a weir trough which conveys flow to the secondary wet well. High flow rates that cause the weir trough to overflow, fill the primary wet well. During typical draining operations, the primary and secondary wet wells will fill simultaneously.

During dry weather, the secondary wet well accepts dry weather flow through a 12” diameter dry weather flow pipe. This dry weather flow will consist of infiltration and inflow to the Kissena Corridor sewers. This pipe originates from the dry weather flow channel located in the Screenings Area immediately upstream of the Influent Channel Sluice Gates. The dry weather flow channel redirects the relatively low dry weather flow before it can flow into the tank. A flap gate on the end of the dry weather flow pipe prevents back flow from the wet wells to the tank influent channel.

In the Spring of 1992, URS examined the main lines of Kissena Corridor and Park Drive East Storm Lines via an Internal Walking Inspection. Flow measurements and sampling (BOD, TSS, Fecal Coliform) were conducted. The survey found that there was a total of 484,000 gpd of dry weather flow of which 142,000 gpd were from sanitary connections while the remaining 342,000 were from infiltration. The sanitary connections locations were reported to NYC DEP for enforcement (assume an 8% success rate) and an analysis showed that 25% of the infiltration may be cost effective to remove. As a result, the estimated future dry weather flow is:

0.20 x 142,000 gpd = 28,400 gpd

0.75 x 342,000 gpd = 256,500 gpd

Therefore, 284,900 gpd (or~200 gpm) dry weather flow is collected through the facility influent channels and is directed to the facility secondary wet well. Two (2) secondary (dry pit submersible type) pumps @ 875 gpm are provided to pump out the dry weather flow from the secondary wet well to the interceptor that discharges to the Tallman Island WPCP. The water surface level in the secondary wet well shall also be monitored to ensure that the secondary wet well is emptied out in a timely fashion and especially before a storm event. This process of emptying the secondary wet well will potentially eliminate any impact on the facility storage capacity. In the future, the actual dry weather flow will be measured and recorded using the flowmeter in the discharge line of the secondary pumps.

The secondary wet well is also used to pump down the primary wet well after the water surface in this wet well has reached a set elevation during pumpback operations. Water in the primary wet well flows to the secondary wet well through a flap gate embedded in the weir wall separating the two wet wells. This flap gate prevents the contents of the secondary wet well from flowing to the primary wet well during dry weather flow.

The Pumping Station, Tank Drain System, and Flushing Water System work together in an integrated, coordinated fashion during the automatic operating sequence called "Pumpback Sequence". Pumpback is the process by which the stored combined sewage is drained from the tank cells to the pumping station wet well. The captured combined sewage is then pumped to the Flushing Interceptor and to the Flushing Water Storage Tank. Stored water in the Flushing Water Storage Tank is used to flush and clean the emptied cells. Spent flushing water drains to the pumping station wet well, and is also pumped to the Flushing Interceptor. Figure 1-4 shows a schematic plan of the Facility.

The actual rate of pumping at any time will depend on the available hydraulic capacity of the Flushing Interceptor, and the available hydraulic and treatment capacity of the TI WPCP. By coordinating pumping rates with the available capacities in the Flushing Interceptor and the TI WPCP, dry-weather overflows will not be induced, and the TI WPCP will meet its SPDES permit limits.

The monitoring and control system will monitor in “real time” the available treatment capacity at the TI WPCP, and the available hydraulic capacity at key locations within the TI WPCP collection system; the pumpback rate will be varied to ensure the prevention of dry weather overflows and overloading the WPCP. The flow and level monitoring stations that will be located with the TI WPCP collection system will be used to control the rate of pumpback as shown in Figure 1-5 and Figure 1-6. The schematic flow diagram of the Facility is shown in Figure 1-7. The flow in Chamber No. 2 is measured and monitored so that the carrying capacity of the Interceptor does not exceed 58 MGD at that point. The flow at the Regulator No. 9 is also measured and monitored so that the carrying capacity of the Interceptor does not exceed 65 MGD at that point. In addition, the flow measured at the Tallman Island WPCP is also monitored at the Flushing Bay CSO Facility so that it does not exceed the TI WPCP capacity (80 MGD) during Pumpback. All the above flow measuring/monitoring functions and the Pumpback are performed automatically. The initial plan of operation is to set the actual pumping rate so that it would be the lowest of the following three values up to a maximum of 32 MGD:

- The spare hydraulic capacity of the TI WPCP. computed as follows:

  Set Point = 80 (+) Pumping Rate (-) Measured TI WPCP Influent Flow. For example, if the rate of pumping is zero, and measured flow is 50 MGD, then the set point would be 30 MGD. The set point will vary with changes in the measured TI WPCP influent flow. The influent flow at the TI WPCP will be provided to the Flushing Bay CSO Retention Facility through a dedicated telephone communication link.

  In the equation above, 80 MGD is a constant that represents the actual plant average dry weather capacity. This maximum value is Operator adjustable dependent upon conditions at the TI WPCP.

- The available hydraulic capacity of the Flushing Interceptor (Chamber No. 2) computed as follows:

  Set Point = 58 (+) Pumping Rate (-) Measured Flow in the Flushing Interceptor Chamber No. 2. For example, if the rate of pumping is zero, and measured flow in Chamber No.2 is 10 MGD, then the set point would be 48 MGD.

- The available hydraulic capacity of TI WPCP collection system Regulator No. TI-R9 (or Regulator No. 9) computed as follows:

  Set Point = 65 (+) Pumping Rate (-) Measured Flow at Tallman Island Regulator No. 9 (Regulator No. TI-R9). For example, if the rate of pumping is zero, and measured flow at Regulator No. TI-R9 is 20 MGD, then the set point would be 45 MGD.

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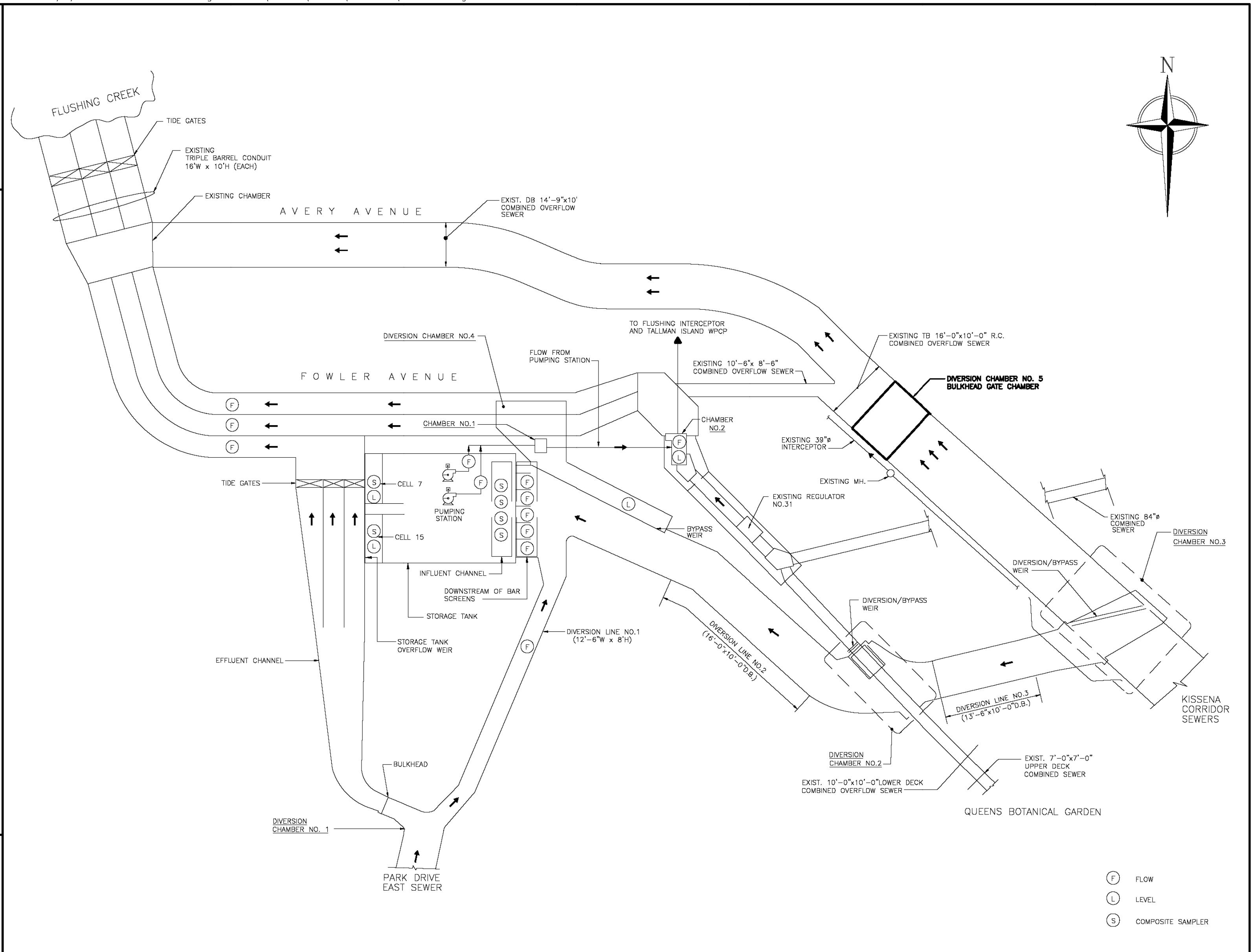

WET WEATHER OPERATING PLAN – FLUSHING BAY

RETENTION FACILITY MONITORING STATIONS

FIGURE 1–4

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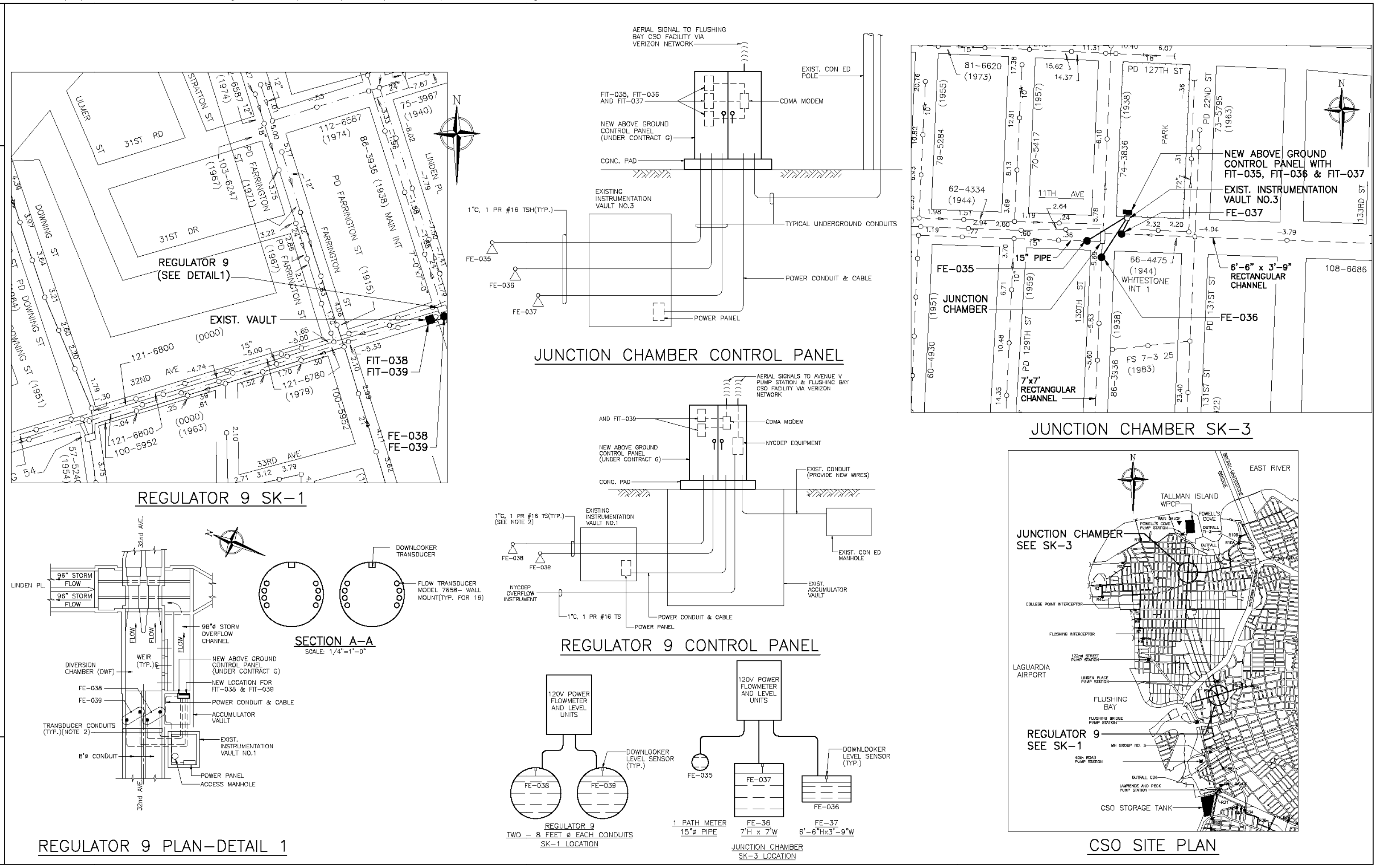
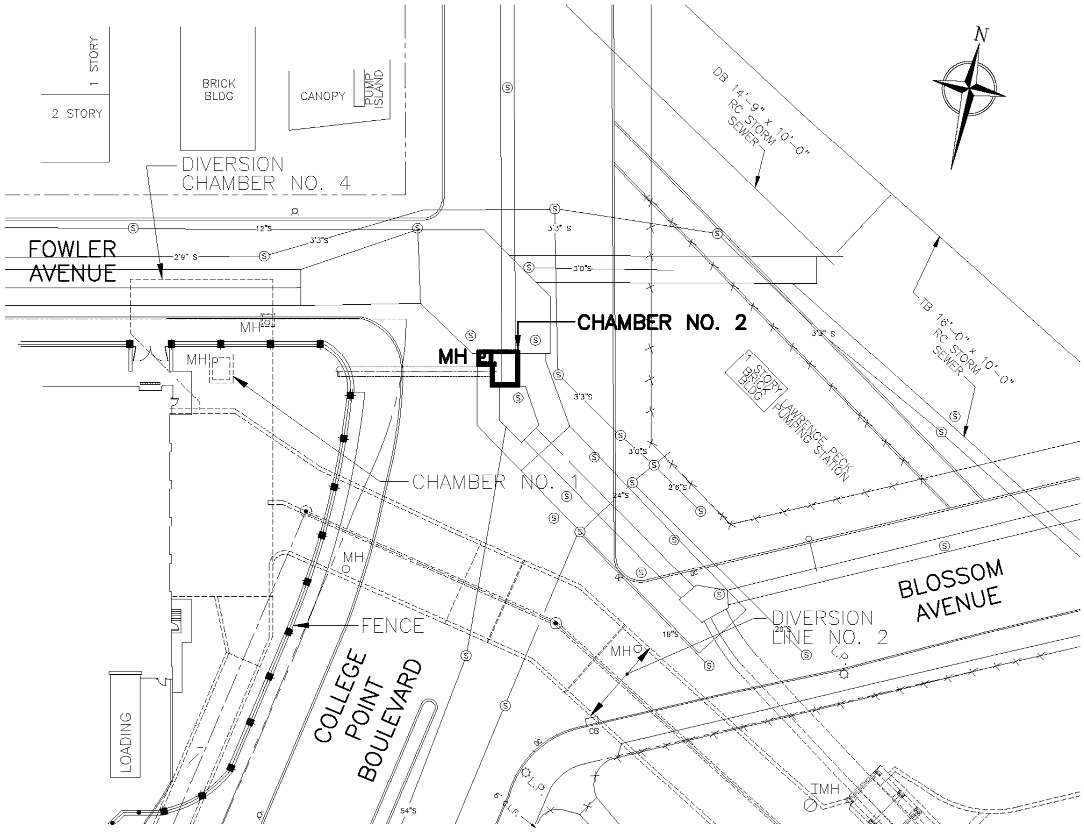


NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP

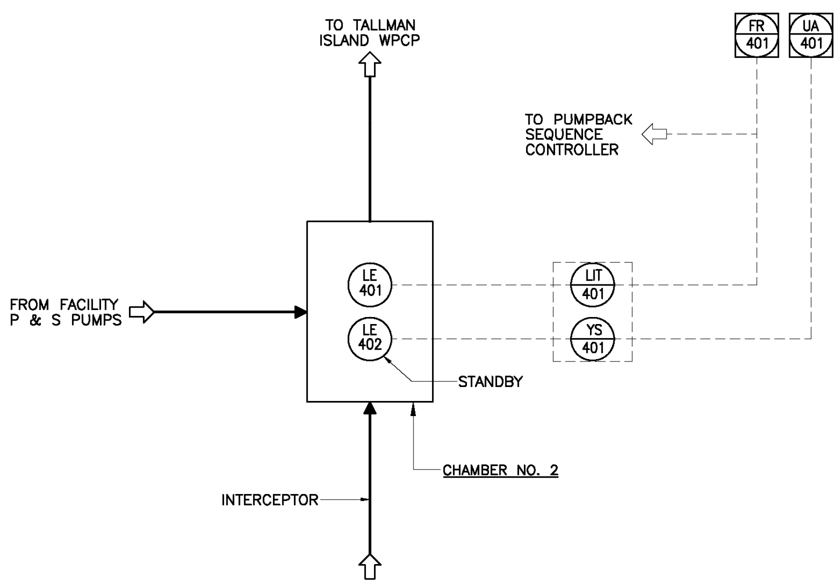
WET WEATHER OPERATING PLAN – FLUSHING BAY

REGULATOR SYSTEM MONITORING STATIONS

FIGURE 1–5



LOCATION PLAN



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NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION DEP

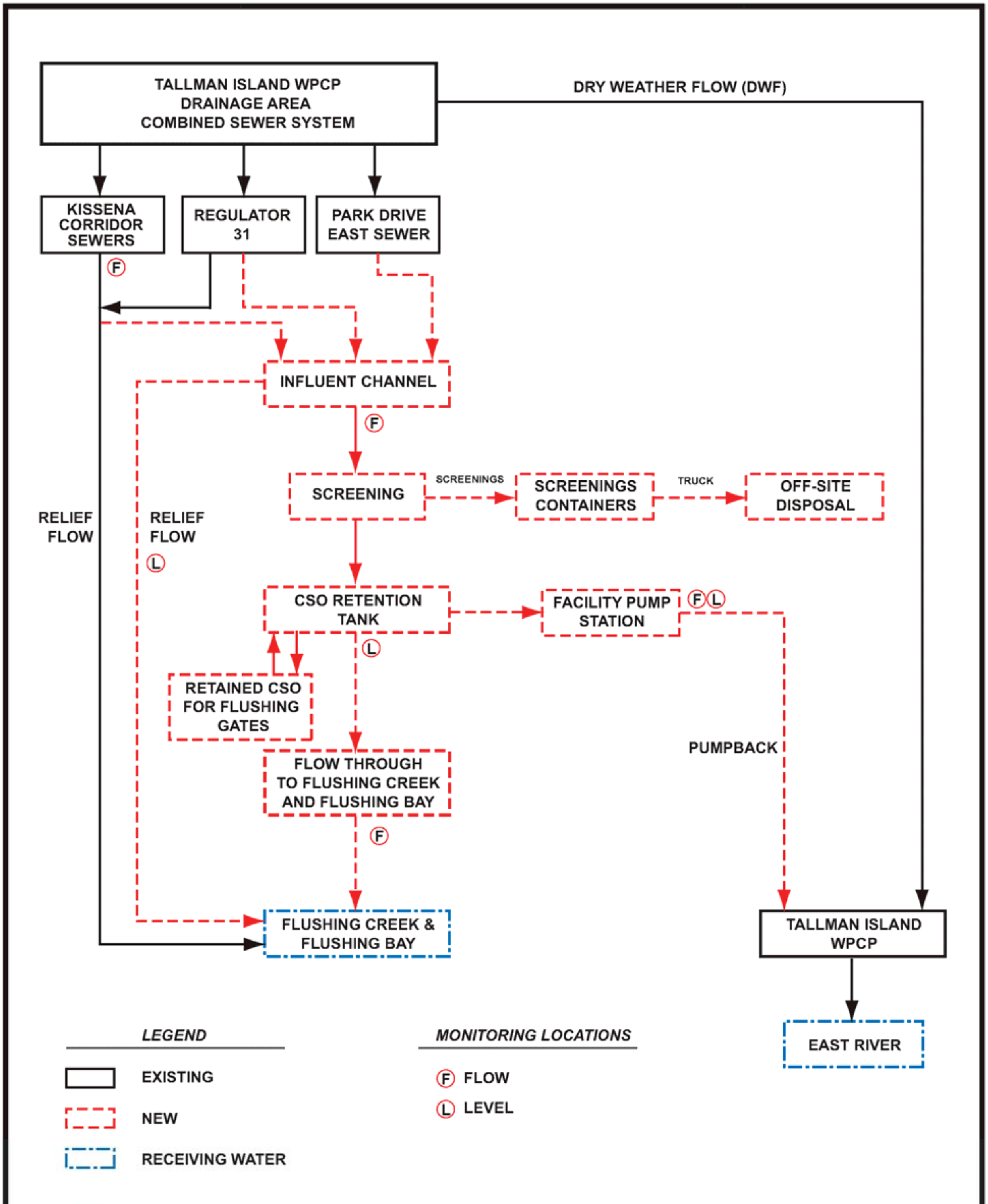
WET WEATHER OPERATING PLAN – FLUSHING BAY

CHAMBER NO. 2

LOCATION PLAN AND LEVEL SENSORS

P & I DIAGRAM

FIGURE 1–6



WET WEATHER OPERATING PLAN - FLUSHING BAY

CSO RETENTION FACILITY SCHEMATIC FLOW DIAGRAM

FIGURE 1-7

In addition to the above logic, pumpback flow setpoint can be controlled through an available option in software by the rate of level change (increase) at Tallman Island Junction Chamber. If the rate of change of water surface elevation exceeds the predetermined amount, the setpoint will decrease inversely proportionally to the rate of change. If the level is still rising after reasonable time of expected correction (initial setting of the lag time is 30 minutes) the pumps will shut down. Pumps will automatically resume their operation when the water surface elevation in the junction chamber falls below the maximum allowed level.

The Pumpback is not limited to nighttime or to dry weather periods following rainfall and CSO capture. The intent is to pumpback the stored CSO whenever there is available capacity at the TI WPCP and also in the Flushing Interceptor at Chamber No. 2 and Regulator No. 9. The Pumpback can be faster if the capacity at the TI-WPCP increases beyond the present capacity 80 MGD providing that the flow rate does not exceed the maximum capacities at Chamber No. 2 (58 MGD) and Regulator No. 9 (65 MGD) as described above. The set point for the rate of pumping out the Facility is adjustable, and would likely be modified in the future based on operator experience, and actual operating conditions.

The facility was designed to be manned 24 hours a day. The pumpback normally occurs during the graveyard shift because this is when the diurnal low flow occurs. So whether the facility is in full automatic mode or in manual, personnel should be on site to run or monitor the equipment status.

A list of the systems/equipment of the Flushing Bay CSO Retention Facility is summarized as follows:

- Mechanically Cleaned Bar Screens, Belt Conveyors and Screenings Containers
- Primary Pumps with Variable Frequency Drives
- Secondary Pumps
- Flushing Water Pumps
- Seal Water System
- Sediment Flushing Gates and associated Hydraulic Power Pack and Control Panels
- Air Handling Units supplying air to the Screening Area, Storage Cells and Wet Wells
- Air Treatment System: Air Blowers, Scrubber Vessels, Recirculation Pumps and Controls and also Chemicals (Caustic and Hypo) and Chemical Feed Pumps

1.2 PERFORMANCE GOALS FOR WET WEATHER EVENTS

The primary goal of the Flushing Bay CSO Retention Facilities is to reduce the frequency and volume of CSOs through Outfall TI-010 into Flushing Bay. With this, the quality of the receiving waters will ultimately be improved by increasing dissolved oxygen (DO) levels, decreasing coliform levels, and decreasing discharges of floatables and settleable solids.

The new influent channels, in-line storage and the CSO storage tank that comprise the Flushing Bay CSO Retention Facility will provide the following pollution control functions:

- CSO Retention Tank with 28.4 MG of storage capacity.
- In-line CSO storage of up to 15 MG in the combined sewers and influent channels upstream of the retention tank.
- Full capture of storm events up to 43.4 MG with subsequent pumping (pumpback) of the retained CSOs to the Flushing Interceptor after storms for conveyance to the TI WPCP where it will be treated.
- Screening of debris and floatables from all CSO passing through the Facility.
- Cleaning of the tank after each storm upon the completion of pumpback operations. Stored combined sewage will be used for this purpose.
- Multiple overflow paths consisting of retention tank overflow weirs, and an influent channel side overflow relief weir to convey peak storm flows of about 1,400 million gallons per day (MGD) through the CSO storage tank (for a 10-month storm; tank empty at onset of storm), and bypass about 590 MGD to Outfall TI-010 (for a 10-month storm; tank empty at onset of storm).

The CSO storage Facility will provide 100 percent capture of combined sewage generated by approximately 90 percent of the storms that occur on an annual basis in the Outfall CS-4 drainage area. Receiving water computer modeling projections indicate that the overall volume of CSOs discharged to Flushing Bay will be reduced; total suspended solids (TSS) loading will be reduced by 77 percent; and the biochemical oxygen demand (BOD) loading will be reduced by 73 percent. In addition, the amount of floatables and settleable solids discharged into Flushing Bay will decrease.

1.3 PURPOSE OF THIS MANUAL

The purpose of this manual is to provide a set of operations the Flushing Bay CSO Retention Facility will undergo in order to best meet the performance goals stated in Section 1.2 and the requirements of the New York SPDES discharge permit. Each storm event produces a unique combination of flow patterns and conditions. No manual can describe every action the Facility will have during every possible wet weather scenario. This manual can, however, serve as a useful reference which both new and experienced operators can utilize during wet weather events, and in preparing for wet weather events.

1.4 USING THE MANUAL

This manual is designed to allow use as a reference during wet weather events, and is meant to supplement the Facility operation and maintenance manual with which operating personnel should be familiar. This manual is broken down into sections that cover operation of the Flushing Bay CSO Retention Facility. The following information is included:

- Facility operations that will occur before, during and after a wet weather event;
- Discussion of why these operations occur;
- Identification of specific circumstances that trigger the recommended changes; and
- Identification of things that can go wrong with the equipment

This manual is a living document. Users of the manual are encouraged to identify new steps, procedures, and recommendations to further the objectives of the manual. Modifications, which improve upon the manuals procedures, are encouraged. With continued input from the Facility’s operations staff, this manual will become a useful and effective tool.

2. UNIT PROCESS OPERATIONS

This section presents equipment summaries and wet weather operating protocols for each major unit operation of the Flushing Bay CSO Retention Facility. The protocols are divided into steps to be followed before, during and after a wet wea ther event. The protocols also address the basis for the protocol, events or observations that trigger the protocol and a discussion of what can go wrong. The following information and protocols apply to proposed unit processes.

2.1 BULKHEAD CHAMBER AND DIVERSION CHAMBERS

Diversion chambers are provided to divert the CSO flow from the CSO lines to the Facility influent structures. Park Drive East CSO line flow is entirely diverted into the Facility through the Diversion Chamber No. 1. Chamber No. 2, on the Kissena Corridor double deck sewer, diverts the flow from the lower deck (10’ x 10’) CSO line into the Facility. A 7’ high weir is constructed across the CSO line. Diversion Chamber No. 3 which is located on the Kissena Corridor Triple Barrel (16’ x 10’ each barrel) CSO line, diverts the CSO flow into the Facility. A bulkhead chamber is constructed downstream of the Diversion Chamber No. 3. The Bulkhead Chamber (Chamber No. 5) as illustrated in Figure 2-1, includes slide gates (16’ x 7’) installed in each channel which divert the CSO flow through the Diversion Chamber No. 3.

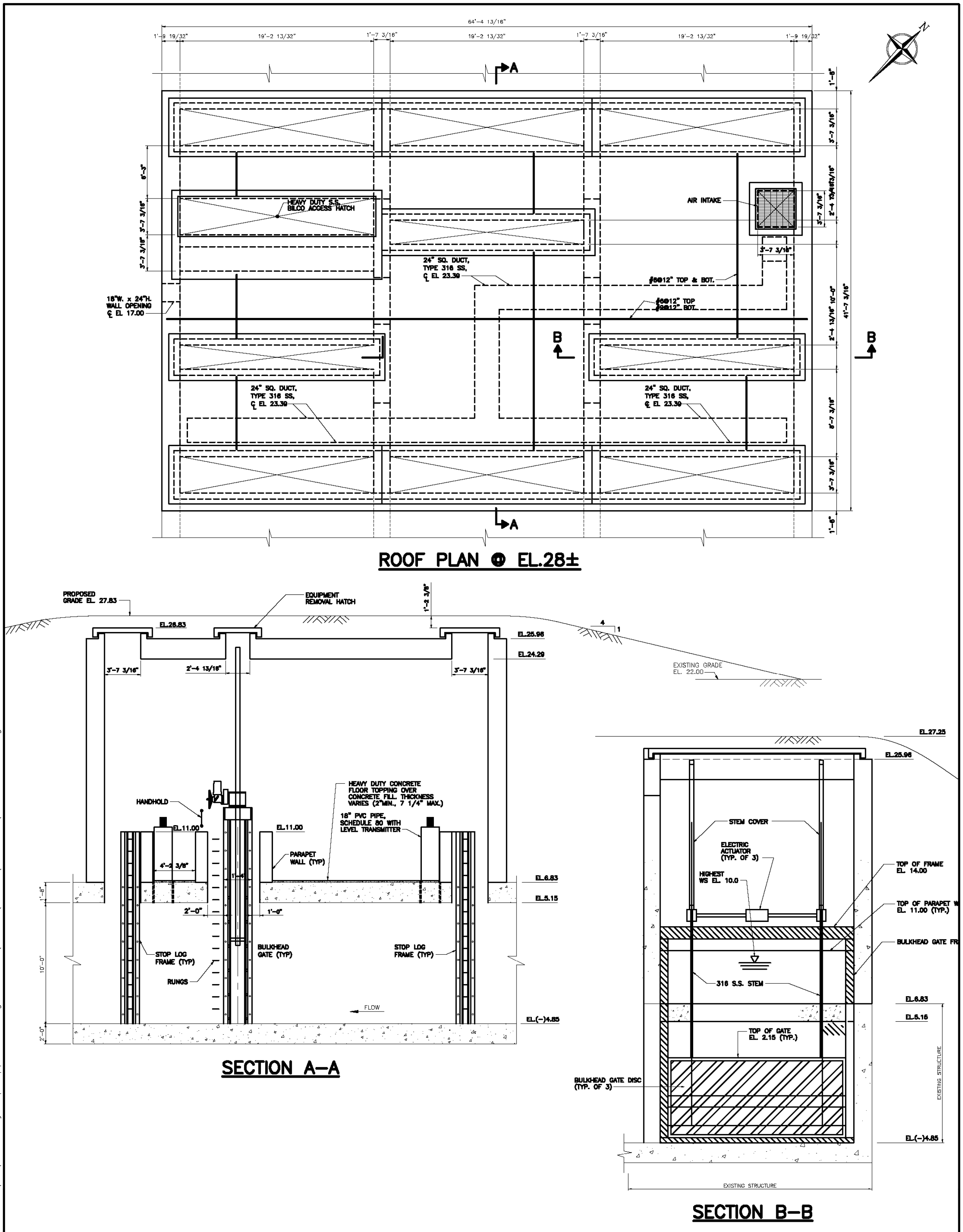
Before Wet Weather Event

1. Dry weather conditions (Infiltration and Inflow) are not expected to produce high volume of flow. Dry weather flow is diverted to the Facility by means of weirs and slide gates constructed across the CSO lines.

During Wet Weather Event

1. Diversion Chamber No. 1 (Park Drive East CSO lines). The entire CSO flow is diverted to the Facility

2. Diversion Chamber No. 2 (Kissena Corridor: Lower Deck and Double Deck storm sewers). A 7’ high weir constructed across the CSO line of the Lower Deck, diverts the flow to the Facility. During the storm event, the CSO flow is diverted to the Facility. In case the water surface level exceeds the 7’ height of the weir the CSO overflows to the outfall TI-010.



Time: 2:25 P.M. Date: 10/10/2007 joe_pizappi Drawing File: H:\32174\WWOP\FIGURES\FIGURE 2-1.dwg

WET WEATHER OPERATING PLAN – FLUSHING BAY

BULKHEAD CHAMBER NO. 5
ROOF PLAN AND SECTIONS

FIGURE 2–1

3. Bulkhead Chamber. The triple barrel is equipped with a 7' high slide gate across each CSO line. During a storm event, the CSO flow is diverted through the Diversion Chamber No. 3 to the Facility. In case the water surface level exceeds the 7' height of the slide gate, CSO overflows to the outfall TI-010. In case the water surface level in the Flushing Bay and in the Bulkhead Chamber exceeds the set point of EL. 7.00±, the slide gates will open up automatically to provide unobstructed flow through the CSO lines and a signal will be sent to the control room indicating the position of the gates.

After Wet Weather Event

1. Check for any debris formation effecting the operation of the slide gates

2. Report any failures of the gates

Why do we do this?

1. Divert the CSO flow into the Facility

2. The slide gates in the CSO lines open to eliminate the potential of the flooding in the upstream sewer lines along the Kissena Corridor.

What can go wrong?

1. If, during a storm event, the water level rises in the Bulkhead Chamber and the gates do not open, an alarm will be transmitted to the Control Room prompting the operator to open the gates manually.

2.2 SLUICE GATES AND MECHANICAL BAR SCREENS

The Screening Area of the Flushing Bay CSO Retention Facility has been provided to remove and collect for disposal floatables, large solids and trash such as wood, rocks and other bulky debris that would adversely affect the operation and maintenance of the storage tank and downstream equipment, particularly pumps.

Unit Process	Screening Area Equipment
Screening	Five (5) Influent Sluice Gates;
	Five (5) Mechanical Bar Screens;
	One (1) Collecting Belt Conveyor;
	One (1) Reversing Belt Conveyor;
	Ten (10) 1–CY Self–Dumping Containers;
	Two (2) 30–CY Roll–off Containers;
	Influent level and flow measuring devices;
	Gas Detection Equipment;
	Four (4) Influent Channel Sluice Gates

Before Wet Weather Event

1. Dry weather flows (infiltration and inflow) are not expected to be great enough to initiate the operation of the screens when they are in the automatic operating sequence. However, the removal of solids and debris that may build up on the screens as a result of dry weather flow may be necessary. Therefore, a control strategy shall be provided to allow the periodic EXERCISE operation of the screens during dry weather.

2. This feature will ensure that the mechanical bar screens remain well lubricated and do not "freeze up" after extended periods of dry weather and inactivity. The control strategy for the bar screens shall initiate the EXERCISE routine based on the "elapsed off-timer." The "elapsed off–timer" will start whenever a bar screen is in the automatic operation sequence and the water surface elevation in the Influent Channel is insufficient to initiate operation of the screens.

3. The "elapsed off–timer" will start the bar screens at a set interval and run them for a set duration. The time interval shall be soft-programmed and therefore be operator selectable. The time interval and run duration will be set based on operating experience and judgment. The "elapsed off–timer" shall reset to zero when a bar screen starts. When set up in this fashion, the screen shall not operate unnecessarily. The EXERCISE feature will operate in either the "TIMER" or "CONTINUOUS" sequence of the automatic operation setting. The exercise program will automatically start cross conveyor 1812–00 which will start

longitudinal conveyor 1806–00 which will in turn start the bar screens (Refer to DWG G401 in Appendix A).

4. Under normal operations the mechanical bar screens should be in service.

5. Rotate screen operation to ensure that all screens are in working order.

6. Make sure empty screenings containers are available.

7. During normal operating conditions and provided that there is power to the operator and explosive gases are not present in concentrations above the lower explosive limit (LEL), the control strategy will automatically maintain all the sluice gates in a fully open position at all times to accept incoming flow.

8. Influent Channel No.1 & No.1 Sluice Gates are capable of manual positioning from 0-100% of full open position. Manual gate positioning is required to enhance the flow distribution to the selected cells. Manual positioning will be available from local control station or from the control room SCADA (Refer to DWG G401 in Appendix A).

During Wet Weather Event

1. When the water surface elevation in the channel rises to EL. -4.60 (4.0 ft. channel depth), the belt conveyors and bar screens will start. The equipment will continue to run until the water surface elevation falls to EL. -5.60. At EL. -5.60, the bar screens will stop and the belt conveyors will continue to operate for a set time duration (0–30 min.) and then stop.

2. If the water surface elevation in the channel rises to EL. 6.00, an emergency high level shutdown will occur. At EL. 6.00, the bar screens will stop and the conveyors will continue to operate for a set time duration (0–30 min.) and then stop.

3. When the level falls to EL. 4.00, the conveyors and bar screens will be restarted by the PLC–BS logic control in the CP–BS. If the level rises back up to EL. 6.00, this shutdown cycle will be repeated. When the level falls to EL. -5.60, the bar screens will stop and the belt conveyors will continue to operate for a set time duration (0–30 min.) and then stop.

4. The belt conveyors are interlocked with the bar screens when operated in the "Automatic" mode. In the "Automatic" mode, the conveyors will start at a set water surface elevation in any screening channel. A level sensor will automatically start cross conveyor No. 1812–00 which will start longitudinal conveyor No. 1806–00 which in turn will start the bar screens (Refer to DWG G401 in Appendix A).

After Wet Weather Event

1. Remove screenings for disposal.

2. Repair any failures.

Why Do We Do This?

1. Preventative maintenance on the bar screens will increase the efficiency of the mechanical bar screens by minimizing the floatables discharging into Flushing Creel through Outfall TI-010.

What Can Go Wrong?

In the event of extreme high-flow events, or the failure of equipment that would lead to high water surface levels, such as the blinding of the mechanically cleaned bar screens, the Flushing Bay CSO Retention Facility is designed to passively bypass excess flows over fixed diversion/bypass weirs, and discharge into Flushing Bay. Specific failure possibilities are outlined below:

1. In the event that either belt conveyor fails or shuts down, all bar screens operating in the automatic position will also shut down. The bar screens will restart automatically after the belt conveyors are repaired, operational and running.

2. When it is planned to start the screens during the failure or stoppage of either of the belt conveyors, the Facility Operators should first position the bypass plates on the bar screens so that collected screenings are deposited into the one cubic yard containers, and then start the bar screens manually in the "HAND" position remotely or locally.

3. If the belt conveyors are not operational, then the bar screens can be operated in the automatic position in whichever sequence, "CONTINUOUS" or "TIMER" has been selected provided that the "Belt Conveyors"/"Bypass Chute" selector switch is in the "Bypass Chute" position. The "Belt Conveyors"/"Bypass Chute" selector switch is located in the CP–BS panel

4. The alarm status of the following conditions will be displayed on the CP–BS and OICS. A common malfunction alarm light is also provided on the LCS. The bar screen will shut down and alarm if any of the following conditions exist:

    a. Torque overflow (torque retreat)

    b. Thermal overload

    c. High brake temperature

    d. High Influent level condition (EL. 6.00)

e. Either of the two belt conveyors failed and "Belt Conveyors"/"Bypass Chute" selector switch is not in the "Bypass Chute" position

5. When the safety pull cord is pulled, the belt conveyors and all bar screens will immediately shut down. In order to be restarted, the reset at the LCS must be manually initiated

6. Each belt conveyor is provided with a zero speed switch. Should the zero speed switch indicate the loss of motion to either of the belt conveyors beyond the starting time delay setting, the belt conveyors and bar screens will immediately shut down. In order to be restarted, the reset at the LCS must be manually initiated.

7. Each conveyor is provided with motor overload protection. Should a motor overload condition occur, the belt conveyors and bar screens will immediately shut down. In order to be restarted, the reset at Motor Control Center (MCC) and at the LCS must be manually initiated. Alarm status of the following conditions will be displayed on CP–BS and OICS. A common malfunction alarm light is also provided on the LCS. The belt conveyor will shutdown and alarm if any of the following conditions exist:

   a. Safety pull cord activation

   b. Belt Zero speed switch activation

   c. Motor overload

   d. High Influent level condition (EL. 6.00)

8. If explosive gases are detected in concentrations above the lower explosive limit (LEL), the control strategy will automatically close all influent sluice gates, regardless of the selected mode(s).

9. If a sluice gate local/remote selector switch is left in Local Mode (maintenance position) and is not fully open, the control strategy will initiate an alarm “INFLUENT SLUICE GATE NO. # is not in auto mode” after a time interval (initially set to 60 minutes).

10. If two or more gates are partially or fully closed and the control strategy is unable to automatically raise the gates after the selected time interval, then an alarm condition will be indicated, "More than one gate disabled" on the CP–BS and OICS.

2.3 CSO PUMPING

Unit Process	Screening Area Equipment
Pumping	**PRIMARY PUMPS** Four (4) Primary Pumps and Motors. Capacity: 6,500 – 15,500 gpm each One (1) Primary Pump with motor (spare pump) Four (4) Variable Frequency Drives **SECONDARY PUMPS** Two (2) secondary pumps with motors. Capacity: 875 gpm each One (1) secondary pump with motor (spare pump).

Before Wet Weather Event

1. Pumps are generally cycled to ensure all available pumps are in working order.
2. Check that the wet well monitors are functional.

During Wet Weather Event

1. Continue to cycle pumps to ensure that all available pumps are in working order.
2. Check that the wet well monitors are functional.
3. Monitor water level in the CSO lines.

After Wet Weather Event

1. Tank cells are drained to the primary wet well by the opening of motor operated valves.

2. The Facility Control System monitors the available treatment capacity at the TI WPCP. The actual pumping rate set point is the lowest of three calculated values up to a maximum of 32 MGD. The pumping rate set point is operator-adjustable, and may be changed in the future based on operating experience and future conditions. These three calculated values are dependent on the measured TI WPCP influent flow, available capacity at the Chamber No. 2, and the available capacity at the Tallman Island Regulator No. 9.

3. The primary wet well level will be monitored by an "open diaphragm type" level indicating transmitter LIT–403 (Refer to DWG G403 in Appendix A). Signals from this level transmitter will be used by the PLC–PS to perform the following tasks and logic:

    a. Indicate and record the wet well water surface elevation through the Facility Distributed Control System.

    b. STOP the primary pumping operation when the wet well water surface elevation falls below EL. -35.50.

    c. Enable the primary pumping operation and activate the permissive when the wet well water surface elevation rises to EL.-34.50.

4. The secondary wet well water surface elevation will be monitored by an "open diaphragm type" level indicating transmitter LIT–503 (Refer to DWG G403 in Appendix A). The signal from this level transmitter will be used by PLC–PS to perform the following tasks and logic:

    a. Indicate and record the wet well water surface elevation throughout the Facility control system.

    b. STOP the secondary pumping operation when the wet well level falls below EL. -45.50.

    c. START the secondary pumps when the wet well water surface elevation rises to EL. -44.00.

    d. STOP the secondary pumps when the wet well water surface elevation rises above EL. -33.00.

5. The sensing element of the transmitter will be installed on the west wall of the primary pumps dry well at EL. -48.00. The sensing element (diaphragm) is equipped with a flushing connection which will be activated automatically once every 24 hours for the duration of 3 minutes. This flushing sequence prevents clogging of the area surrounding the diaphragm.

Why do we do this?

1. The pumping operation after wet weather events maintains a safe water level in the pumping station wet wells and prevents dry-weather overflows. This flushing sequence prevents the Facility from flooding.

What triggers the change?

1. The pumping rates and set point trigger the pumpback operation. Pumping rate set points are driven by the measured TI WPCP influent flow, available capacity at the Chamber No. 2, and the available capacity at the Tallman Island Regulator No. 9.

What can go wrong?

1. An alarm will activate if "NO FLOW THROUGH" conditions exist when the transmitter flushing sequence is activated.

2. The maximum water surface elevation in the Facility is EL. 10.00. If the output of the transmitter falls below 4 mA DC (milliampere), then an alarm "Loss of Signal" will be activated.

2.3.1 Primary Pumps

The Primary Pumps are each operated from dedicated Local Control Stations (LCS) adjacent to the pumps. The pumps are controlled and monitored by PLC–PS. The operating control logic and interlocks strategy will be part of PLC–PS program. The Facility SCADA system will provide supervisory control, data monitoring, alarming and reporting (Refer to DWG G403 in Appendix A). The primary pumps each have a capacity of 11,000 gpm at their rating point, are 215 hp, and have variable frequency drive.

Before Wet Weather Event

1. To operate the primary pumps automatically:

    a. Set the Local/Remote selector switch on LCS to the "REMOTE" position.

    b. Set the HAND/OFF/AUTO (HOA) selector switches for all available pumps to the "AUTO" position.

    c. Set the HAND/OFF/AUTO (HOA) selector switches for all available cone valves to "AUTO" position.

d. Select desired "LEAD/LAG/2ND–LAG/STANDBY" configuration by rotating the 6–position "SEQUENCE" selector switch on the front of the panel.

During Wet Weather Event

1. Make sure primary pumps are being operated in automatic mode.

After Wet Weather Event

1. The selected LEAD pump will start provided that all of the following conditions are met:

   a. Wet well level at, or above EL. -34.50

   b. Intake isolation valve is fully open

   c. Discharge isolation valve is fully open

   d. Discharge cone valve is in "AUTO" position and is fully closed

   e. Local/Remote selector switch at LCS in "R" position

   f. Resulting flow set point is at least FIVE (5) MGD

   g. No Alarm conditions exist

   h. Neither secondary pump is in use

2. When the LEAD pump has started, its speed will be automatically controlled by PLCs Proportional Integral (PI) flow controller.

3. If the LEAD pump is at the maximum allowed speed, and flow demand (set point) cannot be met, then the first LAG pump will start. The PI (Proportional Integral) controller will vary the LAG pump speed while the LEAD pump is at its maximum allowed speed. The LAG pump will run at least 50%.

4. If LEAD and LAG pumps are at the maximum allowed speed, and flow demand (set point) cannot be met, then a second LAG pump will start. The PI controller will vary the second LAG pump speed, while maintaining the LEAD and the first LAG pumps at the maximum allowed speed. The second LAG pump will run at least 50% speed.

5. Decrease in the flow demand will cause the output of the PI controller to adjust (lower) the speed of the last pump started. When the LEAD, first LAG and second LAG pumps are running, and the second LAG pump speed drops to 50% (minimum), if the pumped flow is greater than the set point, then the second LAG pump will stop.

6. When the LEAD and first LAG pumps are running, and the speed of both pumps drops to 50% (minimum), if the pumped flow is greater then the set point, then the first LAG pump will stop.

7. When the LEAD pump is running and the pump speed is 50% (minimum), and the pumped flow is greater then the set point, then the LEAD pump will stop.

8. The PLC program will allow for adjustable time delays prior to executing the above conditions. The time delay will be operator selectable and will be determined during start up (initial setting is 120 seconds).

Why do we do this?

1. The pumping operation after wet weather events maintains a safe water level in the pumping station wet wells and prevent dry-weather overflows. This flushing sequence prevents the Facility from flooding.

What triggers the change?

1. The pumping rate and set points trigger the pumpback operation. Pumping rate set points are driven by the measured TI WPCP influent flow, available capacity at the Chamber No. 2, and the available capacity at the Tallman Island Regulator No. 9.

What can go wrong?

1. If during normal operation any pump fails, then the STANDBY pump will automatically start in place of the failed pump.

2.3.2 Secondary Pumps

The Secondary Pumps are operated from dedicated Local Control Stations (LCS) adjacent to the pumps. The pumps will be controlled and monitored by PLC–PS. The operating control logic and interlocks strategy will be part of PLC–PS program. The Facility SCADA system will provide supervisory control, data monitoring, alarming and reporting (Refer to DWG G403 in Appendix A). The secondary pumps each have a capacity of 875 gpm at their rating point, and are 30 hp

Before Wet Weather Event

1. To operate secondary pumps automatically:

    a. Set the Local/Remote selector switch on the LCS to the "REMOTE" position.

    b. Set the HAND/OFF/AUTO (HOA) selector switches for both cone valves to the "AUTO" position.

c. Set the Local/Remote selector switch for both intake and discharge valves to the "REMOTE" position (these valves will be normally open).

d. Set the HAND/OFF/AUTO (HOA) selector switches for both pumps to the "AUTO" position.

During Wet Weather Event

1. Check that secondary pumps are set to automatic.

After Wet Weather Event

1. When in "AUTO", the control logic will automatically alternate the Lead/Standby pump assignment. The Lead function will be assigned to the pump which has less runtime. Logic will compare the runtime values only when both pump "HOA" selector switches are set to the "AUTO" position; or one pump "HOA" switch is set to the "AUTO" position for time longer then 30 seconds (operator selectable).

2. The Lead pump will start provided that the following conditions are met:

   a. Secondary wet well level at, or above EL. -44.00

   b. Secondary wet well level not above EL. -32.50

   c. Secondary wet well level not below EL. -45.70

   d. No Primary pump in service

   e. Intake isolation valve is fully open

   f. Discharge isolation valve is fully open

   g. Discharge cone valve is in "AUTO" position and is fully closed

   h. Local/Remote selector switch at LCS in "R" position

   i. No Alarm conditions exist

3. The Lead or Standby pump will stop automatically if any of the following conditions exist:

   a. Secondary wet well level falls below EL. -45.70

   b. Secondary wet well level rises above EL.-33.00

   c. Any Primary pump starts (in any mode)

   d. Cone Valve malfunction

e. Isolation valves are not open

f. Pump malfunction

4. The PLC program will allow for adjustable time delays prior to executing the above conditions. The time delay, operator selectable, is determined during start up (initial setting is 30 seconds).

Why do we do this?

1. The pumping operation after wet weather events maintains a safe water level in the pumping station wet wells. This flushing sequence prevents the Facility from flooding.

What triggers the change?

1. The pumping rates and set point trigger the pumpback operation. Pumping rate set points are driven by the measured TI WPCP influent flow, available capacity at the Flushing Interceptor, and the available capacity at the Tallman Island Regulator No. 9.

What can go wrong?

1. If during normal operation any pump fails, then the STANDBY pump will automatically start in place of the failed pump. The standby pump will start immediately upon failure of the Lead pump.

2.4 FLUSHING WATER SYSTEM

Unit Process Components	Equipment
Sediment Flushing Gates (HFG System)	a. Three (3) sediment flushing gates also called Hydroself Flushing Gates complete with anchoring systems for each storage cell, a total of forty-two (42) gates. b. Eight (8) hydraulic power packs complete with junction box, solenoid valves, pumps, reservoir, motors, control panel(s), etc. c. Three (3) flushwater storage area adjustment pipes for each storage cell, a total of forty-two (42) pipes. d. All necessary hydraulic tubing, the conduits for tubing, the conduit anchors. e. Eight (8) (minimum) Local Control Panels. f. Three (3) level sensors including cable up to Hydraulic Power Rack Control Panel for each storage cell or a total of forty-two (42) sensors.
Sediment Flushing Buckets (SFT System)	Three (3) Sediment Flushing Bucket systems in Storage Cell No. 2.
Flushing Water Feed System	a. Water Storage Tank b. Flushing water feed pumps c. Valves d. Flow measurement e. Local control panel

How does it work?

1. A Flushing Water System has been provided to wash down the storage cell(s). Storage cells are flushed with an application of Hydroself Flushing Gate System after a storage cell has been drained. Settled solids on the tank cell floor will be carried to drain. Stored combined sewage from one of the last cells filled or any selected cell(s) will be stored and used as wash down water to clean all of the other cell(s). Each cell can be drained and washed down independently of any of the other cells.

2. The Flushing Water Feed System will pump the stored water from the Flushing Water Storage Tank into Hydroself Flushing System (HFG) storage reservoir as required. Cell No. 2 is washed using the Sediment Flushing Bucket (SFT) system. The flushing Water Feed Pumps pump water stored in the Flushing Water Storage Tank to the storage cell cleaning system (Refer to DWG G405 & G406 in Appendix A).

Why do we do this?

1. Following each rainfall event, combined sewage stored in the storage cells will be drained into the wet well and pumped to the Flushing Interceptor. This is done in order to keep the tank storage cells clean and free from solids deposition, and to minimize the potential for odors.

What triggers the change?

1. Storage Cell Level, Flushing Water Storage Tank Level, Flushing Water Feed Header Pressure and Flow are the main parameters that activate the control logic for the system to operate.

Before Wet Weather Event

1. The Flushing Water System main function is to drain the combined sewage stored in the storage cells therefore before a wet weather event the system should be ready to store CSO and cells should have been emptied after the previous wet weather event.

2. Make sure all the indicators and recorders are operational.

During Wet Weather Event

1. During a wet weather event, the cells should be filling and the flushing water system must be set to start operation after the wet weather event

2. Make sure all instruments are operational.

After Wet Weather Event

Storage Cell Level Measurement (Refer to DWG G402 in Appendix A):

1. Each cell is monitored by an "open diaphragm type" Level Indicating Transmitter (LIT). The signal from the level transmitter will be used by PLC–FS, which is located in the Flushing System Control Panel. The PLC–FS will be programmed to perform the following tasks and logic:

    a. Indicate and record cell levels throughout the Facility distributed control system.

    b. Enable the flushing water supply pumping operation and activate the permissive in the last cell identified to have a water surface elevation of at least EL.-5.00. (Pumping control strategy is explained below in section "Flushing Water Supply Pump Control").

    c. STOP the flushing water supply pumping operation when the water surface level of the selected cell falls below EL.-10.50.

Flushing Water Storage Tank Level Measurement (Refer to DWG G402 in Appendix A):

1. The Flushing Water Storage Tank (FWST) stores combined sewage that has been gravity fed from a selected cell. Stored water will be used to automatically clean cells in the sequence described below. The FWST level is monitored by an "open diaphragm type" Level Indicating Transmitter (LIT). The signal from the level transmitter is used by PLC–FS, which is located in the Flushing System Control Panel. The PLC–FS performs the following tasks and logic:

    a. Indicates and records the FWST level throughout the Facility distributed control system.

    b. Alarm when the water surface level is below EL. -23.00, or rises above EL. -13.00.

    c. Controls the operation of the alternate (City Water) supply in case of emergencies. A motor operated valve on the City water supply line will respond (Open or Close) to tank level demand. The valve will enable its manual operation when the tank water surface level falls below EL. -18.00, and close (if was opened) when the level rises above EL. -14.00.

Flushing Water Feed Header Pressure and Flow Measurement (Refer to DWG G406 in Appendix A):

1. A Pressure Indicating Transmitter PIT–300 will be provided and installed on the flushing feed header.

2. The signal from the transmitter will be used by the single loop Pressure Indicating Controller PIC–300 as a process variable (PV). The output of the PIC will vary the speed of the Flushing Water Feed Pumps during the cell washing sequence. The PIC default set point will be initially set to 65 psig. The derivative portion of the controller will be turned off. The set point may be adjusted (supervisory control though SCADA) to meet required pressure and flow based on various field conditions.

3. The PLC logic will maintain the pressure set point (SP) for Flushing Water Feed Pumps(s).

What Can Go Wrong?

1. The sensing element of the transmitter is installed on one of the cell drain lines in the operating gallery at EL. -20.00. The maximum Facility water surface is EL. 10.00, therefore the maximum static pressure that the diaphragm will sense is 30 feet. Programable Logic Controler (PLC) will alarm the loss of signal when the output of the transmitter falls below 4 mA DC.

2. The sensing element of the transmitter is installed on the west wall of the storage tank at EL. -27.50, as shown on the Contract Drawings. The tank overflows into the Wet Well, when the water surface level reaches EL. 7.00. The maximum static pressure that the diaphragm will sense is 35 feet. The PLC will alarm the loss of signal, when the output of the transmitter falls below 4 mA DC.

3. Flushing water feed flow will be measured by a flow meter (FIT–301), installed on the discharge of the flushing water feed pumps. Initiate an alarm if flow during the pumping rises above 90% of flowmeter capacity AND the header pressure falls below 10%. This situation may indicate major leakage and therefore flushing water feed pumps will be stopped. Initiate alarm "FLUSHING WATER FEED SYSTEM LEAKAGE"

2.4.1 Flushing Water Feed System

How Does it Work?

1. The Flushing Water Feed Pumps are operated from dedicated Local Control Stations (LCS) adjacent to the pumps. The pumps will be controlled and

monitored by PLC–FS. The operating control logic and interlocks strategy will be part of PLC–FS program. The Facility SCADA system will provide supervisory control, data monitoring, alarming and reporting.

Before Wet Weather Event

1. Make sure that flow meter (FIT) is working properly (Refer to DWG G405 in Appendix A).

2. Make sure Flushing Water Feed Pumps are operational.

During Wet Weather Event

1. Make sure that flow meter (FIT-301) is working properly (Refer to DWG G406 in Appendix A).

2. Make sure Flushing Water Feed Pumps are operational.

After Wet Weather Event

1. Flushing water feed flow is measured by a flow meter (FIT–301), installed on the discharge of the flushing water feed pumps (Refer to DWG G406 in Appendix A).

2. To operate the Flushing Water Feed Pumps automatically:

   a. Set the Local/Remote selector switch on LCS to the "REMOTE" position.

   b. Set the Local/Remote selector switch for both intake valves to the "REMOTE" position.

   c. Set the HAND/OFF/AUTO (HOA) selector switches for cell selection to the "AUTO" position.

   d. Switch the Pressure Indicating Controller (PIC–300) to Auto Mode, so that the Pressure Set Point will be generated based on the actual header condition.

   e. Set the HAND/OFF/AUTO (HOA) selector switches for every available pump to the "AUTO" position

3. There are three pumps Lead, Lag and Standby. When in "AUTO", the control logic will automatically alternate the initial Lead/Lag/Standby pump assignment. The Lead function will be assigned to the pump which has less runtime. Logic will compare the runtime values only when all pumps are OFF. The standby pump starts immediately upon failure of either Lead or Lag pump.

4. The Lead pump starts automatically provided that all of the following conditions are met:

a. "Pumpback" sequence is initiated

b. Cell has completely drained as measured by Cell level transmitter.

c. Flushing storage tank level above EL. -14.00

d. Cell selector HOA switch is in "AUTO" position

e. Selected Cell valve is fully open

f. Pump intake isolation valve is fully open

g. HFG is closed and level behind the gate is low.

h. No Alarm conditions exist

5. The pump speed is controlled by Pressure Indicating Controller PIC–300. This Proportional Integral (PI) controller will maintain the speed of the pump(s) to maintain the pressure in the flushing feed header 60 PSIG.

6. Start the Lag pump if the Lead pump is at maximum speed for longer then 30 seconds, and the header pressure is still below the set point. At this time both pumps will share the load and operate at the same expected speed. However, if both pumps ramped to 100% speed and the pressure set point could not be reached, or flow is above expected within next 60 seconds both pumps will stop. This condition may have resulted from discharge pipe rupture.

7. If Lead and Lag pumps are sharing the load and the Set Point and flow is maintained within expected limits, stop the Lag pump if both pumps ramped their speed down below 1300 RPM.

8. The lead pump stops automatically when:

   a. Cell flushing sequence is competed (Operator selectable time duration)

   b. Cell has completely drained as measured by Cell level transmitter.

   c. Flushing storage tank level below EL. -18.00

   d. Selected Cell valve is not fully open

   e. Pump intake isolation valve is not fully open

   f. Any alarm conditions exist.

9. Upon completion of the Cell flushing cycle (Operator selectable time duration) the PLC program will stop Flushing Water Feed Pump(s), close both drain valves and initiate flushing sequence for next available Cell.

10. The facility personnel shall physically inspect the storage cells after each storm to assess the number of times the flushing sequence needs to be repeated to achieve satisfactory results. The data from various storm events shall be collected and analyzed to determine an average number of flushing cycles to use after a storm event. This will eliminate the need for inspection after each storm.

What Can Go Wrong?

1. An alarm will initiate if flow during the pumping rises above 90% of flowmeter capacity and the header pressure falls below 10%. This situation may indicate major leakage and therefore flushing water feed pumps will be stopped. Provide time delay (initial setting 60 sec.) for flow and pressure to stabilize.

2.4.2 Hydroself Flushing Gate System

After all of the tank cells are drained, and pumpback operations have been completed, tank flushing operations will begin.

Sediment flushing gates (HFG [Hydroself Flushing Gate] system) will be used to flush and clean settled solids and debris from the floor of storage cells. The system will use the volume of water captured during rainstorms to effectively flush each tank cell. The gates are designed, constructed and installed to completely clean cell floor with one flush when filled with five (5) feet of water above the bottom of the gate opening. In case the storage cell floor is not clean and additional flushing is required the storage reservoir can be filled by Flushing Water Feed Pumps.

The HFG Control Panel controls the operation of the three (3) flushing gates (typical for all cells except No.2). Each gate is equipped with its own hydraulic operator (integral part of the flushing gate). The gates will be flushed one at a time. Each gate will be furnished with a solenoid control valve. The solenoid valves will be attached to the manifold located on the top of the oil reservoir. The pump is also attached to the top of the oil reservoir. The reservoir, manifold, solenoids, pump and motor will be housed in their own enclosure, within the manually the Control Panel (Refer to DWG G404 & G406 in Appendix A)

Before Wet Weather Event

1. Make sure flushing gates are locked in the closed position

2. Make sure all instruments are operational.

During Wet Weather Event

1. During rainstorm the three flushing water storage areas (FWSAs) will fill, and the flushing gates will remain in the locked and closed position until all the water is drained from the Storage Cell. Once the Cell is drained, upon the initiation of a flushing sequence signal, the water stored in the FWSAs is sequentially released to flush each one of the three bays within the Storage Cell. This sequence will be adjustable so as to allow the drainage of the end sump between each flush. Once all the bays are flushed, the system will return to its initial state (all gates are Closed and hydraulic system is Off).

After Wet Weather Event

The operation of the system will be regulated based on signals received from three (3) Level switches, which are provided by HFG vendor.

1. The PLC logic will monitor, control and execute a round–robin wash cycle of the selected cells. When cell is called to be washed, the PLC will perform the following sequence:

    a. Verify that there are no other cells are being washed, and if not then

    b. Open both drain valves and verify that the cell is drained, as measured by the cell level transmitter.

    c. Verify that the three flushing storage areas are filled as measured by level transmitters. If the levels in the storage area(s) are not sufficient, then logic will open motor operated fill valve and fill the storage areas as necessary. The valve will close when the level reaches the desired value as registered by float switch.

    d. Activate hydraulic cylinder for the Gate, causing it to open and stay open for predetermined time and until the cell is completely drained.

    e. Activate hydraulic cylinder for the second gate, causing it to open and stay open for predetermined time and until the cell is completely drained.

    f. Activate hydraulic cylinder for the third Gate, causing it to open and stay open for predetermined time and until the cell is completely drained.

    g. Close drain valves and proceed with washing of the next scheduled cell.

What Can Go Wrong?

1. PLC and SCADA monitors the performance of the gates system, gate status, and alarms and display these parameters on SCADA screens. When alarm conditions

cause the cell wash cycle to halt, the logic will abort the wash of the current cell, re–schedule the wash, and proceed with washing of the next cell.

2.4.3 Sediment Flushing Bucket

How Does it Work?

1. Storage cell No. 2 is the only cell equipped with Sediment flushing buckets. The buckets have been provided to test this type of tank cleaning technology, and are operated on the principal of counterweight off-balance. When filled with water to a certain level bucket will flip and release the stored water into the cell bay. Buckets will operate operating one at a time.

After Wet Weather Event

1. During the rainstorm, the storage cell and buckets are filled with water. When the storage cell is emptied, and the water surface falls below the buckets, the buckets flip and release their water content. In order to refill the buckets and initiate the flushing sequence, water is supplied to the buckets by the SFT flushing water pumps at a rate of 100 gpm. The capacity of each flushing bucket is 1,000 gallons and there are three (3) buckets in storage cell No. 2.

2. The SFT flushing water pumps discharge to a common header which subsequently divides into three (3) discharge lines that supply water to the flushing buckets. Each discharge line is provided with a motor-operated valve. The flushing sequence is initiated by opening the valve and when the bucket is in the upright position. Water is supplied to one bucket at a time. A flowmeter installed at the common header measures the flow rate and will signal the motor-operated valve to close once the bucket receives 1,000 gallons. The bucket then tips, releasing its water and the flushing cycle is automatically repeated for the second bucket by opening the corresponding valve and finally for the third bucket after the flushing cycle of the second bucket is completed.

What Can Go Wrong?

1. If the SFT flushing water pump does not work the stand-by pump will start (DWG G405 in Appendix A). If the automatic mode is not functioning, the system will be operated in manual or “Alternate” mode. The alternate mode is described in detail in the Flushing Bay CSO O&M manual Chapter VIII, Section B-6. This mode of operation should be used for testing and maintenance. The SFT feed pumps operation is available from the local control station and from the valve local control stations.

2.5 AIR TREATMENT SYSTEMS

The Flushing Bay CSO Retention Facility is been provided with wet scrubber air treatment system to prevent any odors produced in the Facility from becoming a nuisance to either workers in the facility, or to the surrounding community. Possible odor sources within the facility include the influent channels, the screening area, the wet well, and the storage cells. The total ventilation required for these areas is approximately 180,000 cubic feet per minute (cfm). The air treatment system is designed to remove 99.9 percent of the incoming hydrogen sulfide in an air stream of 180,000 scfm with a maximum hydrogen sulfide concentration of 10 ppm

How does it work?

The unit process for the treatment of odorous air is known as chemical absorption. Air is washed or "scrubbed" by being brought into contact with a chemical scrubbing solution of water, sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl). This contact is achieved by blowing the air upward through a scrubber vessel filled with a bed of plastic packing media. The chemical scrubbing solution is sprayed into the scrubber above the packing media and flows downward against the air flow in what is known as counter–current flow. The odorous compounds react with the scrubbing solution to create soluble non–odorous compounds. The treated air passes through a demister, and droplets and moisture are removed from the air stream before it is discharged to the atmosphere (Refer to DWG G409 in Appendix A).

Unit Process Components	Equipment
Air Treatment System (Chemical Absorption)	1. A total of four (4) scrubbers at 45,000 cfm each. 2. Two (2) Recirculating Pumps or a total of eight (8) pumps. 3. A total of four (4) fans. 4. One (1) Booster Fan (Blower). 5. Dampers. 6. Static mixers and other appurtenances. 7. Miscellaneous ducts, inlet boxes, connections, gaskets, and other items required to make the system fully operational.

Four (4) air treatment modules, each rated at 45,000 cfm are provided to treat odorous air. Odorous air is collected from the bar screen influent channels, screenings area, wet well and storage cells. The total ventilation required for these areas is approximately 180,000 cfm. Fresh air is supplied to the influent channel, screening area, wet well and storage cells. The volume of supply air is six percent less than the exhaust air volume, ensuring negative pressure in the odorous areas.

During Normal Operation

During normal conditions, three out of the four modules serving the Facility Air Treatment process will be in operation; the fourth module serves as a standby unit which will activate automatically upon the failure of any of the three working modules. The module "Stand–by" assignment selector switch will be provided on the CP–AT. This 5–position selector switch assigns the Automatic stand-by function as shown in the Table on DWG No. G432-1 in Appendix A.

During normal operation the STANDBY module will start in place of the failed module. Each module consists of various equipment as described below:

1. Modules 3 and 4 are used primarily for the storage cells. If the operation of one of these modules should become compromised because of malfunctions of the Supply Fans, and the lack of adequate supply air to the storage cells, then the following interlocks will be performed by the PLC logic:

    a. If both modules are "ON", the unit which has more accumulated runtime in hours will be shut down.

    b. If modules 1, 2, 3 are "ON", AND Module 4 is "OFF", then Module 3 will shut down.

    c. If modules 1, 2, 4 are "ON", AND Module 3 is "OFF", then Module 4 will shut down.

2.5.1 Scrubbers

Each of the four (4) scrubbers is provided with a blower, and two recirculation pumps. One recirculation pump serves as a standby unit. Sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) are added to the scrubber sump to maintain the pH in the sump between 10 and 13, and maintain a clear solution in the sump. Chemicals feed concentrations are 25 percent NaOH, and 15 percent NaOCl. Over time, as the scrubber solution reacts with contaminants in the air stream, it becomes less reactive and requires the addition of chemicals to restore its strength. NaOH and NaOCl are added to the sump underflow by chemical feed pumps. The addition of NaOH is regulated by a pH control system, and the addition of NaOCl is regulated by an Oxidation Reduction Potential (ORP) control system. The two control systems ensure that the odor removal effectiveness of the scrubbing solution is always at its maximum.

How Does the Booster Blower Work?

1. A booster blower is provided to increase the rate of air exhausted from storage cells during maintenance activities, and when Facility personnel are present in any of the cells.

During Normal Operation

1. To operate Blower automatically:

    a. Set the Local/Remote selector switch on LCS–SB to the "REMOTE" position.

    b. Set the HAND/OFF/AUTO (HOA) selector switch to the "AUTO" position.

    c. Check that the module is not selected as "STANDBY".

How Do the Recirculation Pumps Work?

1. The eight Scrubber Recirculation Pumps are integral components of the four Air Treatment Modules. Each module is served by two recirculation pumps. Each pump can be operated from a dedicated Local Control Station located adjacent to it. The pumps can also be operated from the Control Panel Air Treatment (CP–AT), and the Operator Interface Computer Station (OICS), both of which are located in the Main Control Room.

During Normal Operation

1. To operate the pumps automatically:

    a. Set the Local/Remote selector switch on LCS to the "Remote" position.

    b. Set the HAND/OFF/AUTO (HOA) selector switch to the "Auto" position.

2. When in "AUTO," the control logic will automatically alternate the Lead/Stand–by pump assignment. The lead function will be assigned to the pump which has less runtime. The cumulative runtime values will be compared only when both pumps are operating in the automatic mode with their "HOA" selector switches set to the "AUTO" position; or one pump "HOA" switch is set to the "AUTO" position for a time period longer than 30 seconds (operator adjustable). The standby pump will start immediately upon failure of the lead pump.

3. The Lead pump will start provided that the following conditions are met:

a. Scrubber sump water surface level minimum 18”.

b. NO Alarm conditions exist.

c. The associated module is not selected as a "STANDBY."

4. The Lead or Standby pump will stop automatically if any of the following conditions occur:

   a. Low scrubber sump level.

   b. Pump discharge pressure greater then 30 psig.

   c. Seal water pressure falls below 10 psig.

   d. Recirculation flow rate dropped below 500 gpm.

   e. Pump malfunction.

5. The PLC program will allow for adjustable time delays prior to executing the above conditions. The time delay will be operator selectable and will be determined during start–up (initial setting is 30 seconds).

6. It should be noted that the air treatment system operates on a continuous basis therefore the procedures for before, during, and after wet weather events are the same.

2.6 CHEMICAL FEED AND STORAGE SYSTEM

The Scrubber Chemical Feed Pumps are integral components of the Air Treatment Modules. The purpose of these pumps is to maintain the desired levels of pH and ORP in the scrubber sump solution. The pumps are equipped with variable stroke drive, integral to the units. The pump stroke is adjusted automatically by the Analytical Indicating Controller (AIC) located in the CP–AT panel. The AIC is a Proportional Integral Derivative single loop controller, and automatically maintains pH at 10, and ORP at 600 (set point is operator selectable) (Refer to DWG G410 & G434 in Appendix A).

Unit Process Components	Equipment
Chemical Feed & Storage System	1. Ten (10) including two (2) as spare, metering pumps for sodium hydroxide solution (50% concentration). Each pump will be provided with electronic DLC stroke length positioners/ controllers. 2. Ten (10) including two (2) as spare, metering pumps for sodium hypochlorite solution (15% concentration). Each pump will be provided with electronic DLC stroke length positioners/controllers. 3. Backpressure valves, calibration columns, pulsation dampeners and other appurtenances. 4. All anchor bolts and other hardware required for the complete installation. a. Three (3) Sodium hypochlorite storage tanks. b. Two (2) Sodium hydroxide storage tanks. c. Chemical fill stations and other appurtenances. d. One safety and eyework area shower. e. All anchor bolts and other hardware required for complete installation.

How Does it Work?

1. Scrubbing solution that has passed down through the packing bed of a scrubber flows by gravity to a sump at the bottom of the scrubber vessel. The collected scrubbing solution is recycled continuously from the sump back to the top of the scrubber vessel by recirculating pumps.

2. The sump overflows continuously, discharging the products of reaction with the scrubbing chemicals. Over time, as the scrubber solution reacts with contaminants in the air stream, it becomes less reactive and requires the addition of chemicals to restore its strength. NaOH and NaOCl are added to the sump underflow by chemical feed pumps. NaOH and NaOCl are stored in separate tanks. Three (3) tanks are used to store NaOCl; two (2) tanks are used to store NaOH.

3. The addition of NaOH is regulated by a pH control system, and the addition of NaOCl is regulated by an Oxidation Reduction Potential (ORP) control system. The two control systems ensure that the odor removal effectiveness of the scrubbing solution is always at its maximum. Make–up water is fed continuously from the City water supply system to replace water lost through the continuous overflow. The sump overflow is piped to the Facility chemical drain system. The Facility chemical drain system discharges to secondary wet well of the pumping station.

4. The pumps are operated from dedicated, controls integral to the pumps. The pumps can also be operated from the Control Panel Air Treatment (CP–AT), and Operator Interface Computer Stations (OICS) both of which are located in the Main Control Room.

During Normal Operation

1. To operate the pumps automatically:

    a. Set the Local/Remote selector switch on integral LCS to the "Remote" position.

    b. Set the HOA selector switch on the AIC to the "Auto" position.

    c. Set the pump HAND/OFF/AUTO (HOA) selector switch to the "Auto" position.

2. When the pump is in the "Auto" position the control logic will automatically alternate the Lead/Stand–by pump assignment. The lead function will be assigned to the pump which has less runtime. The Runtime values will be compared only when both pumps "HOA" selector switches are set to the "AUTO" position; or one pump "HOA" switch is set to "AUTO" position for a time period longer than 30 seconds (operator adjustable). The standby pump will start immediately upon failure of the lead pump.

3. The lead pump will start provided the following conditions are met:

    a. Recirculation flow exists, as determined by FIT.

    b. Chemical storage tank level is not LOW.

    c. NO alarm conditions exist.

    d. ORP or pH requirements are not met.

4. The lead or standby pump will stop automatically if one of the following conditions exists:

    a. No Recirculation Flow

b. Low chemical storage tank level

c. Pump discharge pressure greater then 60 psig

d. Discharge relief line is active, as sensed by flow switch on the relief line

e. pH or ORP is above set point, and pump stroke is at its minimum for 10 minutes continuously

f. Pump malfunction

5. The PLC program will allow for adjustable time delays prior to executing the above conditions. The time delay will be operator selectable and will be determined during start–up (initial setting is 30 seconds).

2.7 SAMPLING & ANALYSIS

2.7.1 Monitoring Requirements

Beginning with the completion of construction, the following effluent overflow parameters, listed in Table 2.1, shall be monitored and the sampling results shall be reported on the monthly operating report.

Table 2 - 1. SPDES Monitoring Requirements for CSO Regional Facilities

OVERFLOW PARAMETER	REPORT	UNITS	SAMPLE FREQUENCY	SAMPLE TYPE	FN
Overflow Volume	total, per event (7)	MG	See Footnote 5	Calculated	(1) (4)
Retained Volume	total, per month	MG	See Footnote 5	Recorded, Totalized	(8)
BOD, 5-day	average, per event	mg/l	1 / Each day of event	Composite	(2)
Total Suspended Solids	average, per event	mg/l	1 / Each day of event	Composite	(2)
Settleable Solids	average, per event	ml/l	1 / Each day of event	Grab	(3)
Oil & Grease	average, per event	mg/l	1 / Each day of event	Grab	(6)
Screenings	total, per month	cu. yds.	---	Calculated	
Fecal Coliform	geometric mean, per event	No./100ml	1 / Each day of event	Grab	(3)
Precipitation	total, per event	inches	Hourly / Each day of event	Auto, Recording Gauge within drainage area	

FOOTNOTES:

(1) Flows refers to effluent overflows associated with the design storm for the CSO retention facility.
(2) Composite sample shall be a composite of grab samples, one taken every four hours during each overflow event.
(3) When the facility is manned, grab samples are to be taken every four hours during each overflow event.
(4) Effluent overflow shall be calculated using a hydraulic model of the sewer system that is approved by the DEC. The permittee shall submit a report, with the first annual CSO BMP

report, explaining the hydraulic model calibration of the combined sewer drainage system tributary to the facility for DEC approval.

(5) In addition to the data supplied on the monthly operating report, the permittee shall provide a summary of the required monitoring to be submitted annually as part of the CSO BMP report required in CSO BMP #14 of this permit. The report shall tabulate sampling results, summarize the number of overflow events, the volume during each event, volume retained and pumped to the WPCP, and the peak flow rate (a calculated number) during each event, and provide an evaluation of the performance of the facility.

(6) Only when the CSO retention facility is manned.

(7) An event starts once overflow out of the CSO retention facility begins, and ends once the overflow stops and the pumpback to the associated wastewater treatment plant has finished.

(8) The permittee shall measure and record the total volume of flow retained and returned to the WPCP each month.

SPECIAL CONDITIONS FOR OPERATION OF THE CSO RETENTION FACILITY

1. The facilities shall be operated in conjunction with the tributary system, pump stations and the WPCP to maximize CSO capture.
2. Upon completion of construction of the retention facility and associated pumping station and conveyances, the permittee shall divert rain induced combined sewage flow to the facility in accordance with the design criteria and the WWOP. The permittee shall notify the Department in writing in accordance with 6 NYCRR Part 750-2 of any changes in the operation due to construction.
3. The permittee shall not discharge from the CSO retention facility unless the tank volume is full to the estimated 28 MG of facility storage and 15 MG of inline storage and/or the facility cannot accept additional wastewater.
4. The contents of the CSO retention facility, (i.e. captured wastewater) shall not be delivered to the WPCP at a rate which would exceed the peak flow or loading as determined by the CSO BMP#4. The WWOP will detail operating conditions of the CSO retention facility.
5. Flow shall not be delivered to the WPCP at a rate that will cause an upset as defined 6 NYCRR Part 750-1.2(a)(94).
6. If a new CSO retention facility is constructed in the drainage basin of the WPCP, a NY-2A application, as well as the NY-2A Supplement for the Control Facilities, must be submitted to the Department, and the permit modified to include the facility, before construction can commence. In addition, DEP shall modify the WWOP in CSO BMP#4 to reflect the changes required for the new facility.

2.7.2 Monitoring Performed

All samples must be taken in conformance with the permit, and are to be taken and preserved according to all regulatory guidelines.

1. Overflow Volume. Effluent overflow is defined as the CSO volume discharged to the facility's effluent channel over the effluent weir in storage cells No. 7 and No. 15 during a storm event. The total effluent overflow volume (MG) per event shall be monitored and reported. The SPDES permit states that the overflow volume shall be calculated using a hydraulic model of the sewer system that is approved by the DEC.

In the Flushing Bay CSO Retention Facility, the overflow volume is calculated as the difference between the incoming flow to the facility and the pumpback flow to the Tallman Island WPCP for the duration of the overflow event. Incoming flow to the facility is monitored and recorded by means of velocity/depth profile measurement downstream of the bar screens. Pumpback flow is measured by magnetic flowmeters.

2. Retained Volume. Stored CSO is pumped to Tallman Island WPCP after a storm event is over and there is adequate capacity in the Interceptor and the Tallman Island WPCP. The Retained Volume is defined as the total CSO volume that is stored in the Retention Facility during a storm event and is equal to the total volume pumped to the treatment facility during the pumpback operation. The SPDES permit states that the total Retained Volume shall be measured, recorded and totalized for each month. Overflow Volume and Retained Volume shall also be submitted annually as part of the CSO BMP report.

   The Pumpback flow is measured, recorded and totalized directly by using magnetic flowmeters on the discharge lines of the Primary and Secondary pumps.

3. BOD, 5-Day, Total Suspended Solids. BOD, 5-day and Total Suspended Solids (TSS) composite samples shall be taken from the facility's effluent channel and shall be reported as average per event. The composite samples shall be a composite of grab samples from the effluent channel taken every 4 hours during each overflow event. BOD, 5-day and TSS samples are collected every 4 hours from a point in cell No. 7 and cell No. 15 near to the effluent weir.

4. Settleable Solids. Settleable Solids grab samples shall be taken from the facility's effluent channel and shall be reported as average per event. When the facility is manned grab samples shall be taken every 4 hours during each overflow event.

5. Oil & Grease. When the facility is manned, Oil & Grease grab samples shall be taken from the facility's effluent channel and shall be reported as average per event.

6. Screenings. Screenings shall be calculated and reported as total per month. Screenings are collected in the screenings containers and reported as total per month.

7. Fecal Coliform. Fecal Coliform grab samples shall be taken from the facility's effluent channel and shall be reported as the geometric mean per event. When the facility is manned grab samples shall be taken every 4 hours during each overflow event.

8. Precipitation. SPDES permit states that precipitation data (in inches of rain) shall be acquired hourly for each day of event and shall be reported as total per event. Precipitation data are obtained from the local weather station in LaGuardia airport.

APPENDIX A

Process and Instrumentation Drawings

LIST OF DRAWINGS

DWG G400	Legend and Symbols
DWG G401	Flow Diagram Bar Screen System
DWG G402	Flow Diagram Storage Cells Drain System
DWG G403	Flow Diagram Primary and Secondary Pump Station
DWG G404	Flow Diagram Flushing Water Supply System
DWG G405	Flow Diagram Flushing Water Pumping System
DWG G406	Flow Diagram Flushing Water Feed System
DWG G409	Flow Diagram Air Treatment Systems
DWG G410	Flow Diagram Chemical Storage and Feed Systems
DWG G432-1	P & ID Air Treatment System - Air Blowers
DWG G433-1	P & ID Air Treatment System - Scrubbers
DWG G434	P& ID Air Treatment Chemical System

INSTRUMENT SYMBOLS AND IDENTIFICATION:

	INSTRUMENT IDENTIFICATION LEGEND				
	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, FLAME		NOT USED	NOT USED	NOT USED
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	CLOSED
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING (DIMENSIONAL)		GLASS GAGE (UNCALIBRATED)		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE OR HUMIDITY				MIDDLE OR INTERMEDIATE
N	NOT USED		NOT USED	NOT USED	NOT USED
O	NOT USED		ORIFICE (RESTRICTION)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT STATUS	Y AXIS		RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

"E" INDICATES EXISTING DEVICE.
"*" INSTRUMENT SUPPLIED BY EQUIPMENT VENDOR.

FLOW INDICATING TRANSMITTER FIELD MOUNTED. POWER SUPPLY REQUIRED LOCALLY WHERE SHOWN. SEE THIS DWG. FOR DETAILS OF INSTRUMENT TAG NUMBERING SYSTEM.

FR & AR ARE TWO INSTRUMENTS AS PART OF ONE UNIT. SEE BELOW FOR PROCESS ANALYSES (XX).

FL – FLUORIDE CONCENTRATION
TCl_2 – TOTAL CHLORINE RESIDUAL
FCl_2 – FREE CHLORINE RESIDUAL
DO – DISSOLVED OXYGEN
$FeCl_3$ – FERRIC CHLORIDE
H_2S – HYDROGEN SULFIDE
H_3PO_4 – PHOSPHORIC ACID
H_2SO_4 – SULFURIC ACID
MN – MANGANESE CONCENTRATION
NH_3 – AMMONIA
O_2 – OXYGEN
ORP – OXIDATION REDUCTION POTENTIAL
pH – HYDROGEN ION CONCENTRATION ($-LOG_{10}$)
PO_4 – PHOSPHATE
PC – PARTICLE COUNTER
TRB – TURBIDITY

ALARM POINT IN UNIT ANNUNCIATOR WITH OPERATING CONTACT CONNECTION (A) & REPEAT CONTACT CONNECTION (B).

POINT FOR SHARED VIDEO DISPLAY FUNCTIONS IN LOGIC CONTROLLER. SEE BELOW FOR (X)

- Δ DIFFERENCE
- > HIGH SELECTOR
- < LOW SELECTOR
- S/I FREQUENCY/CURRENT
- I/I CURRENT/CURRENT
- Σ SUMMATION
- PID PROPORTIONAL INTEGRAL DERIVATIVE
- % RATIO

AS ABOVE WITH LIMITED ACCESS; ANNUNCIATOR OR ALARM MESSAGE DISPLAY

COMPUTER SOFTWARE LOGIC FUNCTIONS
# INDICATES DESCRIPTIVE INTERLOCK NOTE

ELECTRICAL HARD WIRED LOGIC FUNCTIONS
# INDICATES DESCRIPTIVE INTERLOCK NOTE

INLINE FLOW INDICATOR

TURBINE OR PROPELLER ELEMENT

SONIC ELEMENT
M – MICROWAVE
U – ULTRASOUND
R – RADAR

FLOAT SWITCH

INLINE FLOWMETER
M – MAGMETER
V – VORTEX
C – CORIOLIOUS
T – TETMAL DISPERSION

VALVES AND PIPING SPECIALTIES

- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- DIAPHRAGM VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- PINCH VALVE
- NEEDLE VALVE
- CHECK VALVE
- DETECTOR CHECK VALVE
- 3-WAY VALVE
- PRESSURE REGULATING VALVE
- BACK PRESSURE REGULATING VALVE
- CONE VALVE
- DAMPER
  NO – NORMALLY OPEN
  NC – NORMALLY CLOSED
- PULSATION DAMPENER
- INLINE STRAINER
- DRAIN
- CHLORINE EJECTOR
- METERING COLUMN
- INLINE MIXER
- BACKFLOW PREVENTER
- RELIEF VALVE VACUUM OR PRESSURE
- DIAPHRAGM SEAL WITH ISOLATION VALVE
- EYE WASH AND DRENCH EMERGENCY SHOWER HEAD
  FP – FROST PROOF

GATES AMD WEIRS

- SLIDE GATE
- SLUICE GATE
- WEIR TYPE SLIDE GATE
- FLAP GATE

PUMPS AND EQUIPMENT

- CENTRIFUGAL PUMP
- METERING PUMP WITH:
  VI – VARIABLE SPEED DRIVE
  MS – MANUAL STROKE
  VS – VARIABLE STROKE
  FB – FEED BACK
- ROTARY GEAR PUMP
- BLOWER, COMPRESSOR
- SUBMERSIBLE PUMP
- SUMP PUMP

ACTUATORS

- ELECTRIC MOTOR ACTUATOR
- DIAPHRAGM AIR ACTUATOR
- HYDRAULIC CYLINDER ACTUATOR
- SOLENOID ACTUATOR
  MO – MANUAL OVERRIDE
  SPRING OR WEIGHT
- ELECTRIC ACTUATOR WITH
  ZT – POSITION TRANSMITTER
  HK – O/S/C PUSHBUTTONS
  HS – L/R SELECTOR
  ZS – LIMIT SWITCHES
- ELECTROHYDRAULIC ACTUATOR

PUSH BUTTONS AND LIGHTS:

HAND SELECTOR SWITCH OR PUSHBUTTON:

FUNCTION SUBSCRIPTS:

- ACK ACKNOWLEDGE (BLACK)
- FSR FORWARD–STOP–REVERSE
- HOA HAND–OFF–AUTO
- OAC OPEN–AUTO–CLOSE
- LR LOCAL–REMOTE
- OC OPEN–CLOSE (GREEN–BLUE)
- OSC OPEN–STOP–CLOSE (GREEN–GREEN–BLUE)
- POT SPEED POTENTIOMETER
- PTT PUSH–TO–TEST (BLACK)
- RS RESET (BLACK)
- ES EMERGENCY STOP (RED)
- SS START–STOP (RED–GREEN)
- LOS LOCKOUT STOP (GREEN)
- SA START–ABORT SEQUENCE
- COC CLOCKWISE–OFF–COUNTERCLOCKWISE

INDICATING LIGHT UNIT, SEE COLOR CODE (XX)
A – AMBER (ALARM CONDITION)
G – GREEN (OFF, STOP, VALVE CLOSED, CIRCUIT BREAKER OPEN)
R – RED (RUN, START, VALVE OPEN, CIRCUIT BREAKER CLOSED)
W – WHITE (POWER AVAILABLE, 86 RELAY STATUS)
B – BLUE (EQUIPMENT IN REMOTE MODE)
F – FLUSHING

STROBE OR ROTATING BEACON, SEE COLOR CODE (XX)
A – AMBER
W – WHITE
R – RED
C – CLEAR
G – GREEN

ALARM HORN   ALARM SIREN

FRONT PANEL MOUNTED PUSHBUTTON

FRONT PANEL MOUNTED INDICATOR LIGHT

FRONT PANEL MOUNTED SELECTOR SWITCH

FRONT PANEL MOUNTED PUSHBUTTON WITH INTEGRAL INDICATOR LIGHT

120V – 120 VAC INSTRUMENT POWER SUPPLY, REQUIRES LOCAL DISCONNECT (TYP) PROVIDED BY CONTRACT CS4-4E.

LINE TYPE DESIGNATION

- EXISTING
- ELECTRIC SIGNAL
- COMMUNICATION LINK
- SOFTWARE LINK
- STRUCTURE OR VESSEL
- MAIN PROCESS LINE
- AUXILIARY SYSTEMS
- PNEUMATIC SIGNAL
- CAPILLARY LINE
- HYDRAULIC SIGNAL
- HEAT TRACED AND INSULATED

PROCESS FLOW LINE CONTINUED:
– REFER TO ANOTHER DRAWING
A – MATCH LETTER IF MORE THEN ONE REFERENCE

PROCESS FLOW LINE CONTINUED OUTSIDE SCOPE OF DRAWINGS

AUXILIARY SYSTEM FLOW

I/O TAG NUMBERING SYSTEM

0000 0001 DISCRETE INPUT / OUTPUT

0002 0003 — UNIQUE SEQUENTIAL I/O NUMBER
ANALOG INPUT / OUTPUT

BINARY CODED DEVICE INPUT REQUIRES EIGHT DISCRETE INPUTS

EQUIPMENT NUMBERING SYSTEM

SYSTEM DESCRIPTION (TABLE 1)	SYSTEM CODE	PROCESS CODE
INFLUENT SLUICE GATES; INFLUENT CHANNEL SLUICE GATES, FLAP GATES	1300–1399	13
ELECTRICAL DISTRIBUTION	1500–1549	15
INSTRUMENTATION AND CONTROL PANELS	1550–1599	15
PRIMARY & SECONDARY PUMPS	1600–1619	16
TANK DRAIN VALVES	1620–1650	16
BAR SCREENS, BELT CONVEYORS, CONTAINERS, BAR RACKS	1800–1899	18
FLUSHING WATER SYSTEM INCLUDING VALVES, PUMPS, HFG, & SFT EQUIPMENT	1900–1919	19
FLUSHING WATER SUPPLY VALVES	1920–1939	19
FLUSHING WATER FEED VALVES	1940–1999	19
SERVICE WATER, SEAL WATER AND WASH WATER SYSTEMS	2000–2099	20
SUBMERSIBLE MIXERS	2100–2149	21
HYPOCHLORITE FEED AND STORAGE	4200–4299	42
AIR TREATMENT SYSTEM	4400–4499	44
STORAGE CELL AIR SUPPLY SYSTEM	4500–4599	45
CAUSTIC FEED AND STORAGE	4700–4799	47
AIR SUPPLY VALVES FOR STORAGE CELLS	4800–4899	48
SPARE PARTS	6000–6999	60
BOILER	7200–7299	72
HVAC SYSTEM	7300–7399	73
PLANT AIR, SERVICE AIR, AUXILIARY AIR, VACUUM PRIMING SYSTEMS	7400–7499	74
CITY (POTABLE WATER) SYSTEM	7600–7699	76
FACILITY DRAINAGE SYSTEM INCLUDING PUMPS AND DRAINS	7700–7799	77
ELEVATORS, HOISTS, VEHICLES, CELL ACCSESS DOORS	7800–7899	78
FIRE FIGHTING EQUIPMENT, PAGING & INTERCOM	8400–8499	84
GAS MONITORING EQUIPMENT	8600–8699	86

INSTRUMENT TAG NUMBERING SYSTEM

INSTRUMENT IDENTIFICATION REFER TO ISA STANDARD 5.4 — FIT 1 1 2 A — LOOP NUMBER

NOTE:
1. INSTRUMENT TAG NUMBER DOES NOT CHANGE IF SIGNAL IS BROUGHT TO ANOTHER CONTRACT AREA.

EQUIPMENT TAG NUMBERING SYSTEM

SEQUENTIAL NUMBER UNDER PARTICULAR CODE
PROCESS CODE (SEE TABLE 1)
EQUIPMENT ASSOCIATED WITH MAJOR EQUIPMENT
RESERVED

1601-A0

VALVE TAG NUMBERING SYSTEM

VALVE DIAMETER IN INCHES
PROCESS CODE (SEE TABLE 1)
SEQUENTIAL NUMBER

19-02.75-001

GENERAL NOTES:

1 FOR EQUIPMENT AND VALVE TAGS NOT INCLUDED ON THE P&ID (400 SERIES) DDRAWINGS, SEE MECHANICAL (300 SERIES) DRAWINGS.

2 FOR CONTROL PANEL SCHEDULE SEE SPECIFICATIONS SECTION D-3.4.

3 FOR INSTRUMENT AND I/O SCHEDULES SEE SPECIFICATIONS SECTION D-3.12.

NO.	DATE	DESCRIPTION	APPRD.

REVISIONS

CAPITAL PROJECT NAME & NO.: FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

CONTRACT NAME & NO.: FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

DRAWING TITLE: PROCESS AND INSTRUMENTATION

LEGEND AND SYMBOLS

DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ
SCALE: NONE
DATE: MAY 1999
DWG. NO. G400

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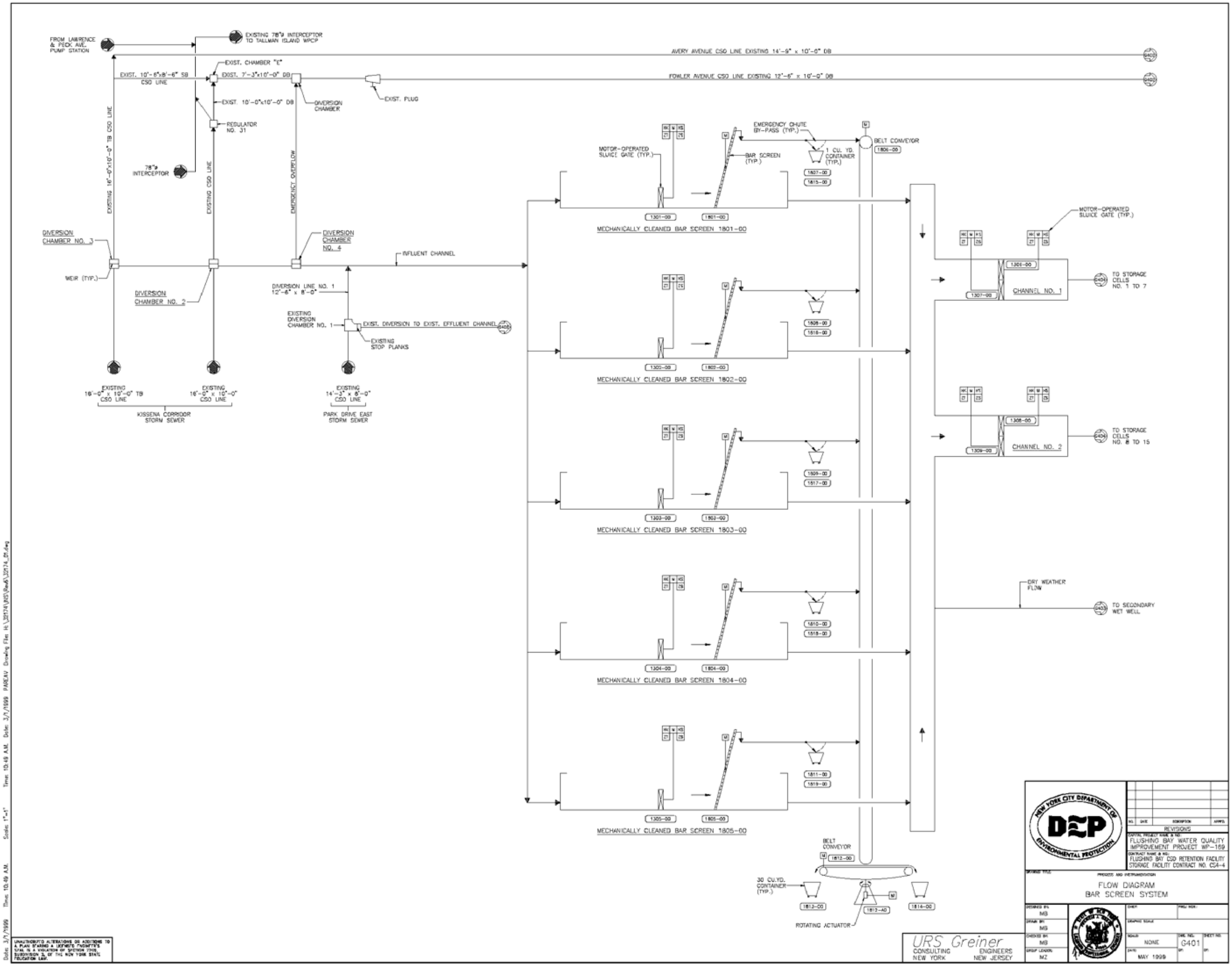
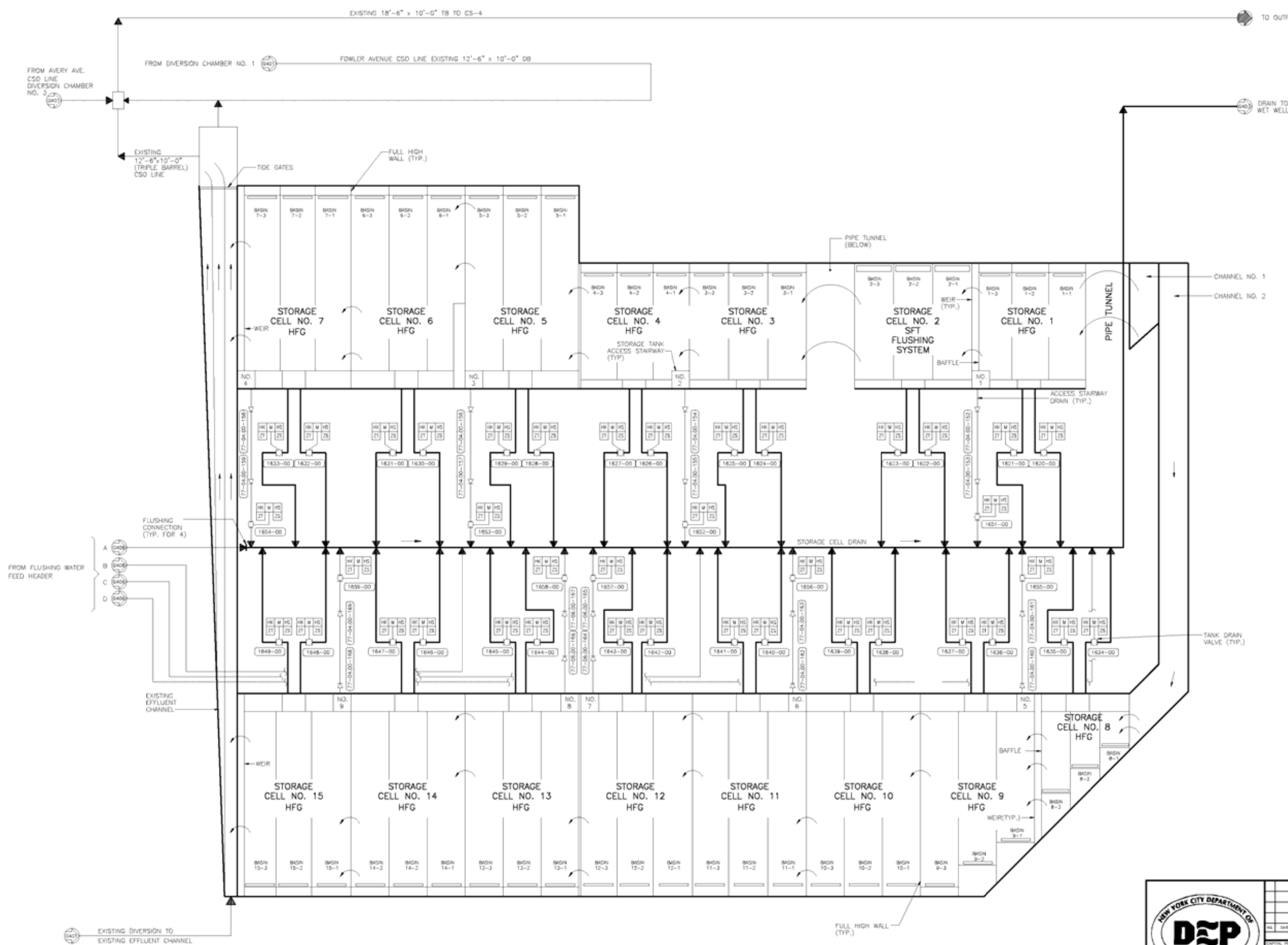
NEW YORK NEW JERSEY

Date: 3/1/1999 Time: 10:49 A.M. Scale: 1"=1" Time: 10:49 A.M. Date: 2/1/1999 PAREAV Drawing File: H:\32174\INS\Revit\32174_00.dwg



Date: 3/1/1999 Time: 10:49 A.M. Scale: 1"=1" Time: 10:49 A.M. Date: 3/1/1999 PAREAV Drawing File: H:\32174\INS\Rev6\32174_01.dwg



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REVISIONS

FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

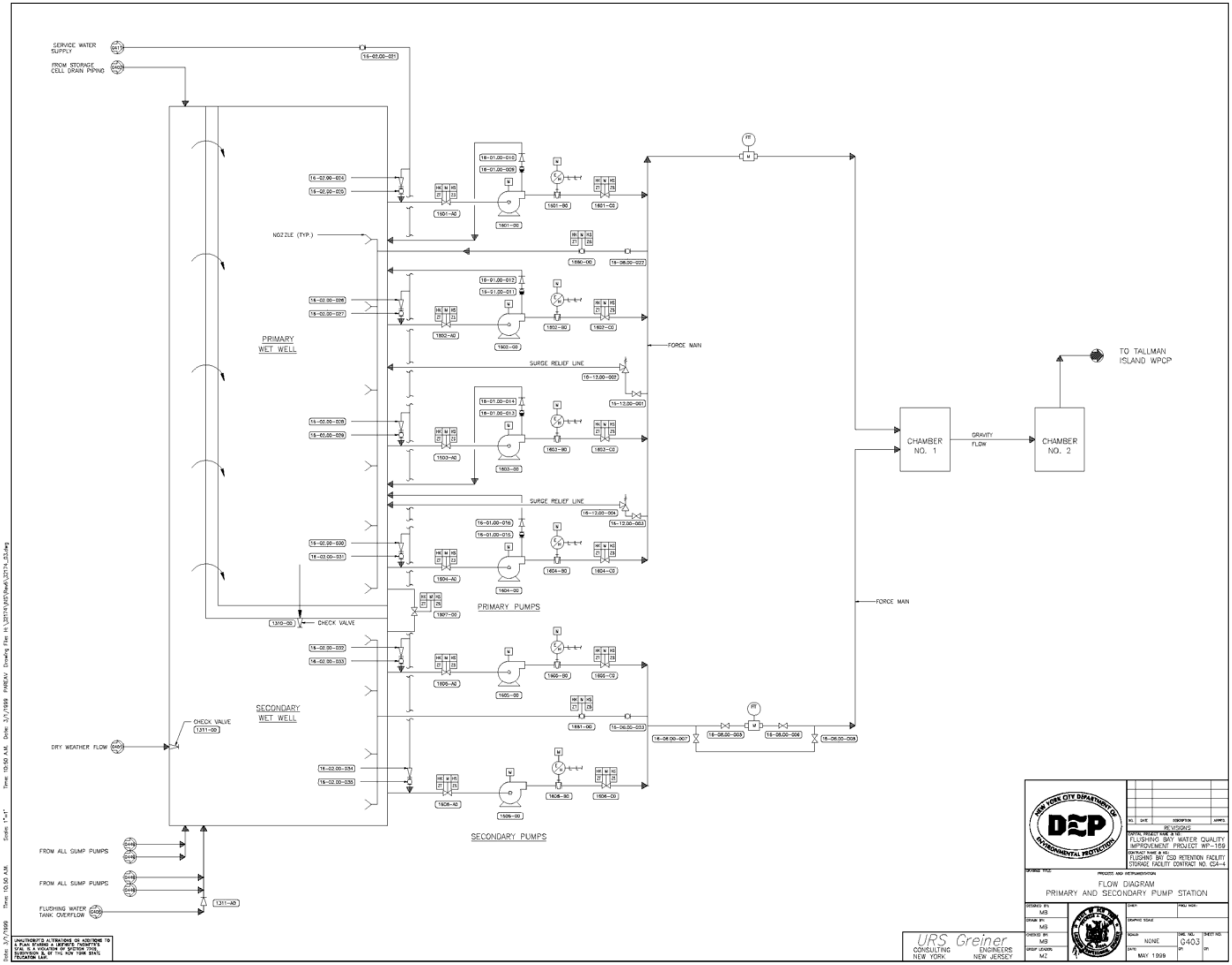
PROCESS AND INSTRUMENTATION

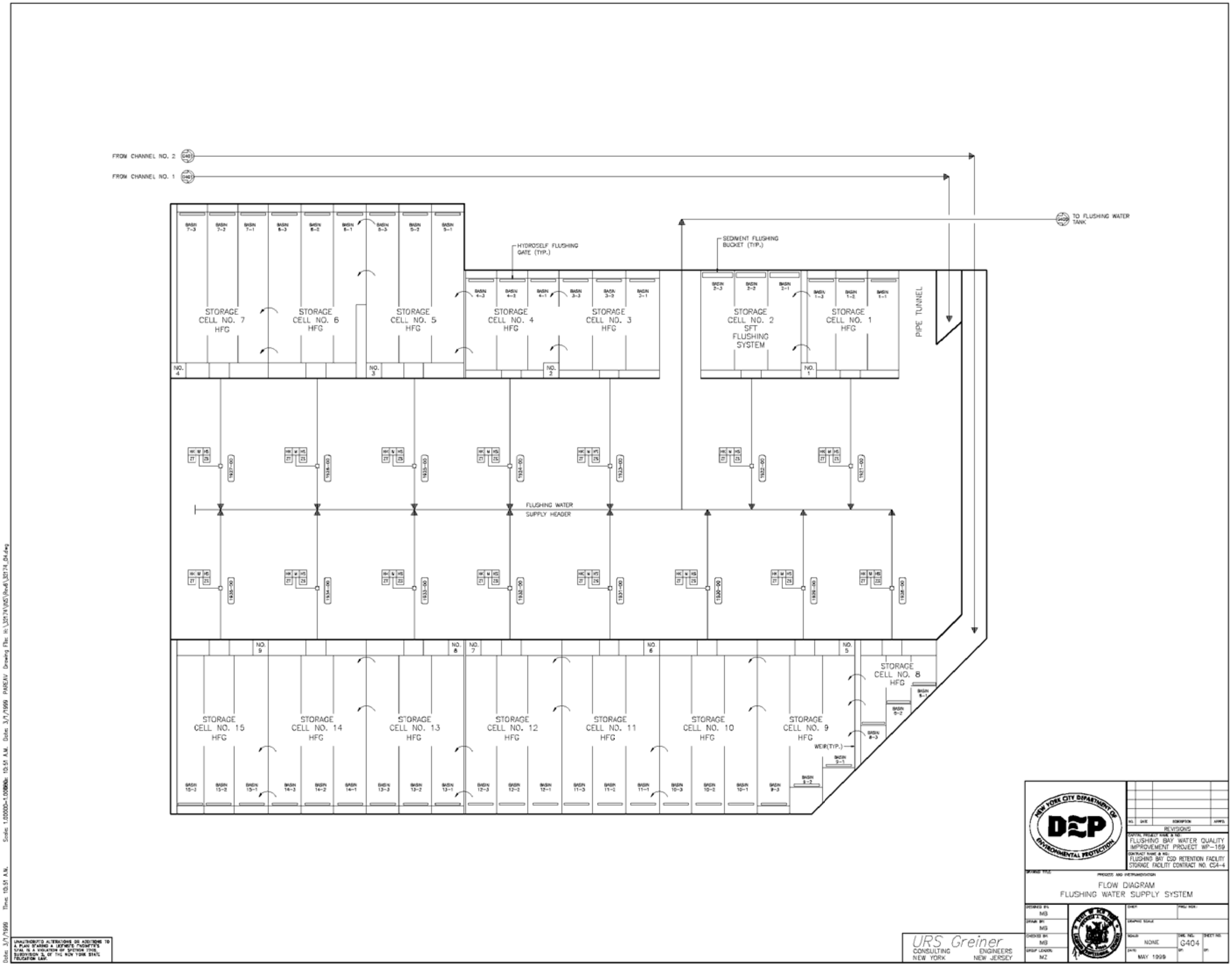
FLOW DIAGRAM
STORAGE CELLS DRAIN SYSTEM

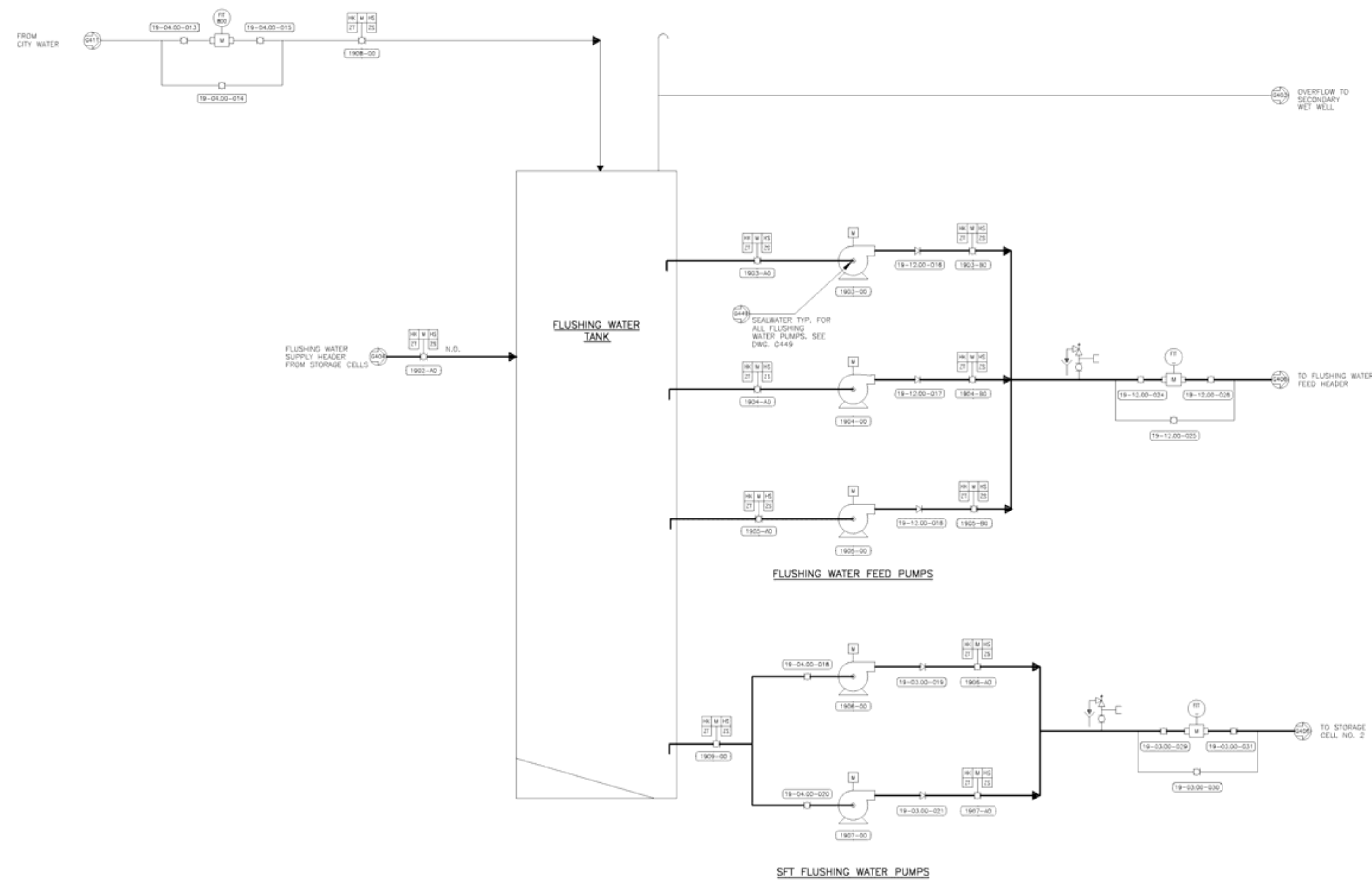
DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ

SCALE: NONE
DATE: MAY 1999
DWG. NO. G402

Date: 3/1/1999 Time: 10:50 A.M. Scale: 1"=1" Time: 10:50 A.M. Date: 3/1/1999 PAREAV Drawing File: H:\32174\NS\Rev6\32174_02.dwg


SERVICE WATER SUPPLY
FROM STORAGE CELL DRAIN PIPING
NOZZLE (TYP.)
PRIMARY WET WELL
SECONDARY WET WELL
CHECK VALVE
DRY WEATHER FLOW
FROM ALL SUMP PUMPS
FROM ALL SUMP PUMPS
FLUSHING WATER TANK OVERFLOW
SURGE RELIEF LINE
SURGE RELIEF LINE
FORCE MAIN
FORCE MAIN
PRIMARY PUMPS
SECONDARY PUMPS
CHAMBER NO. 1
GRAVITY FLOW
CHAMBER NO. 2
TO TALLMAN ISLAND WPCP
REVISIONS
FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169
FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4
FLOW DIAGRAM
PRIMARY AND SECONDARY PUMP STATION
URS Greiner
CONSULTING ENGINEERS
NEW YORK NEW JERSEY
MB
MB
MB
MZ
NONE
G403
MAY 1999


FROM CHANNEL NO. 2
FROM CHANNEL NO. 1
TO FLUSHING WATER TANK
HYDROSELF FLUSHING GATE (TYP.)
SEDIMENT FLUSHING BUCKET (TYP.)
PIPE TUNNEL
STORAGE CELL NO. 1 HFG
STORAGE CELL NO. 2 SFT FLUSHING SYSTEM
STORAGE CELL NO. 3 HFG
STORAGE CELL NO. 4 HFG
STORAGE CELL NO. 5 HFG
STORAGE CELL NO. 6 HFG
STORAGE CELL NO. 7 HFG
STORAGE CELL NO. 8 HFG
STORAGE CELL NO. 9 HFG
STORAGE CELL NO. 10 HFG
STORAGE CELL NO. 11 HFG
STORAGE CELL NO. 12 HFG
STORAGE CELL NO. 13 HFG
STORAGE CELL NO. 14 HFG
STORAGE CELL NO. 15 HFG
FLUSHING WATER SUPPLY HEADER
WEIR(TYP.)
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP
REVISIONS
FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169
FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CSA-4
FLOW DIAGRAM
FLUSHING WATER SUPPLY SYSTEM
URS Greiner
CONSULTING ENGINEERS
NEW YORK NEW JERSEY
NONE
G404
MAY 1999
MB
MZ



NOTES:

1. FOR FLUSHING WATER FEED PUMPS P&ID AND SEAL WATER CONTROLS SEE DRAWINGS G428.
2. FOR SFT FLUSHING WATER PUMPS P&ID AND SEAL WATER CONTROLS SEE DRAWINGS G429.

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REVISIONS

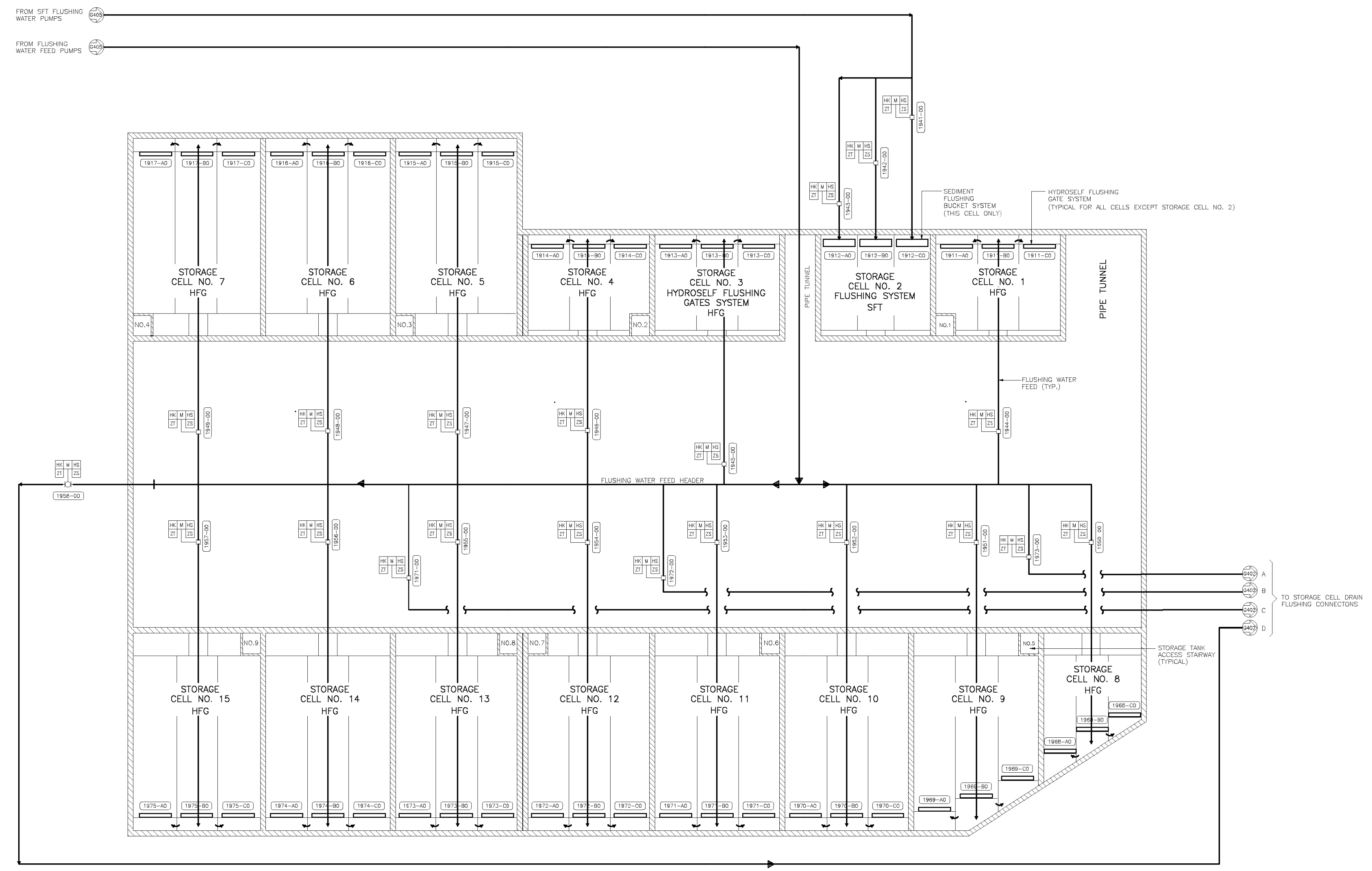
FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

PROCESS AND INSTRUMENTATION

FLOW DIAGRAM
FLUSHING WATER PUMPING SYSTEM

DESIGNED BY	MB
DRAWN BY	MB
CHECKED BY	MB
GROUP LEADER	MZ
SCALE	NONE
DATE	MAY 1999
DWG. NO.	G405



NOTES:

1 FOR HFG AND SFT NUMBERING REFER TO DRAWING G408.

NO.	DATE	DESCRIPTION	APPR'D
		REVISIONS	

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

CAPITAL PROJECT NAME & NO.: FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

CONTRACT NAME & NO.: FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

DRAWING TITLE: PROCESS AND INSTRUMENTATION

FLOW DIAGRAM
FLUSHING WATER FEED SYSTEM

DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ

SCALE: NONE
DWG. NO.: G406
DATE: MAY 1999

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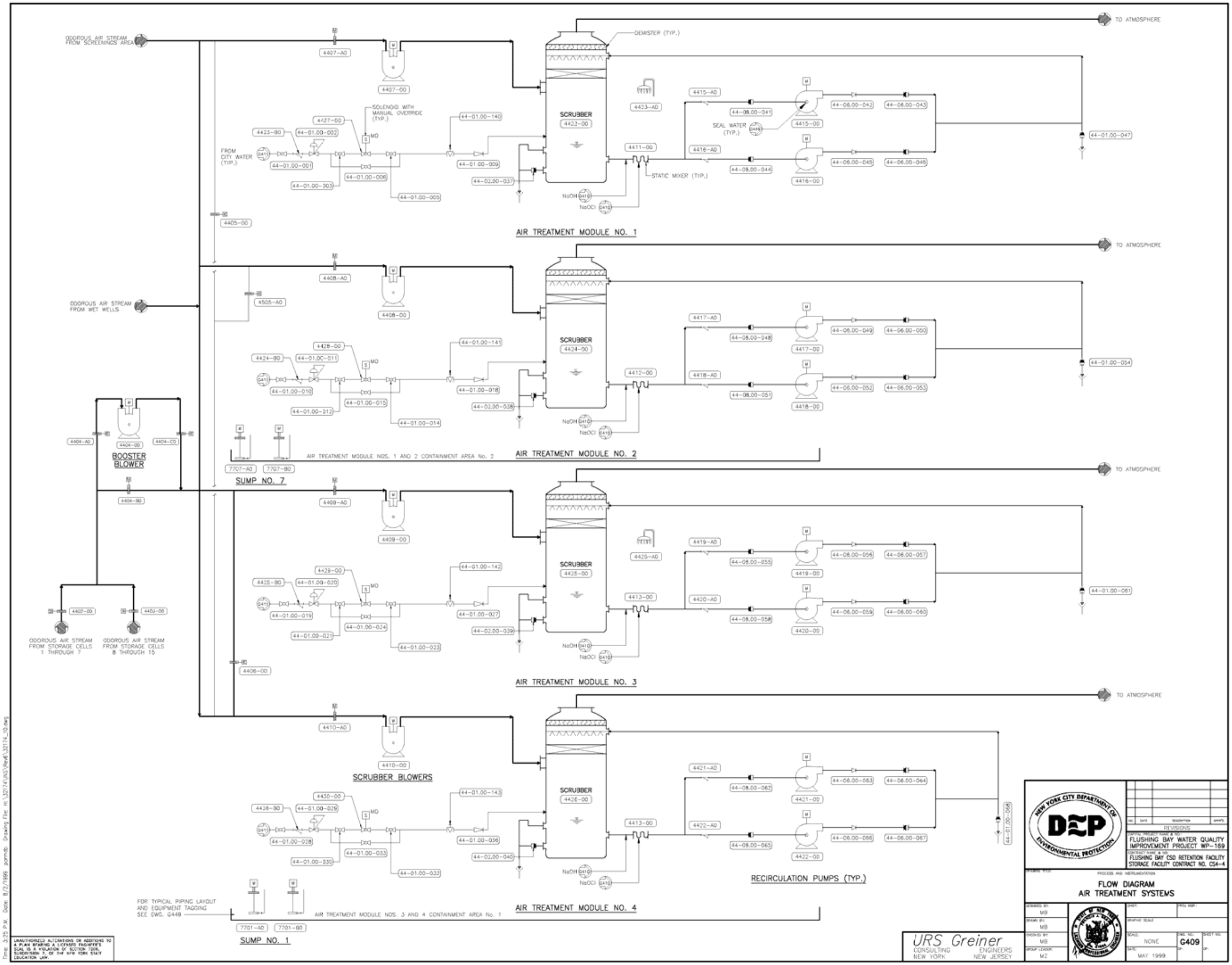
ODOROUS AIR STREAM FROM SCREENINGS AREA
ODOROUS AIR STREAM FROM WET WELLS
ODOROUS AIR STREAM FROM STORAGE CELLS 1 THROUGH 7
ODOROUS AIR STREAM FROM STORAGE CELLS 8 THROUGH 15
BOOSTER BLOWER
SCRUBBER BLOWERS
TO ATMOSPHERE
DEMISTER (TYP.)
SCRUBBER
SOLENOID WITH MANUAL OVERRIDE (TYP.)
FROM CITY WATER (TYP.)
SEAL WATER (TYP.)
STATIC MIXER (TYP.)
NaOH
NaOCl
AIR TREATMENT MODULE NO. 1
AIR TREATMENT MODULE NO. 2
AIR TREATMENT MODULE NO. 3
AIR TREATMENT MODULE NO. 4
AIR TREATMENT MODULE NOS. 1 AND 2 CONTAINMENT AREA No. 2
AIR TREATMENT MODULE NOS. 3 AND 4 CONTAINMENT AREA No. 1
SUMP NO. 7
SUMP NO. 1
RECIRCULATION PUMPS (TYP.)
FOR TYPICAL PIPING LAYOUT AND EQUIPMENT TAGGING SEE DWG. G449
UNAUTHORIZED ALTERATIONS OR ADDITIONS TO A PLAN BEARING A LICENSED ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.
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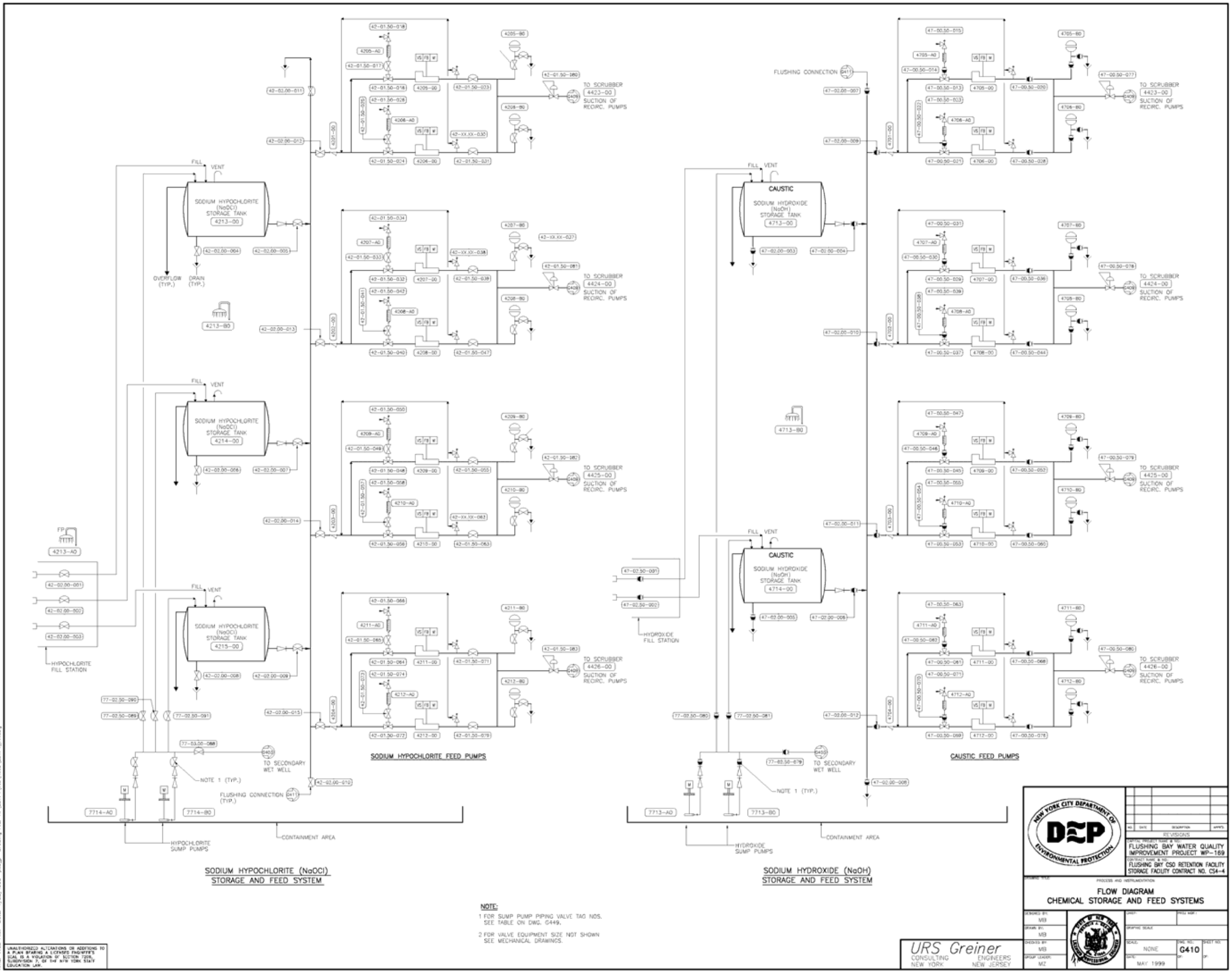
DEP
FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169
FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4
FLOW DIAGRAM
AIR TREATMENT SYSTEMS
MB
MB
MB
MZ
NONE
MAY 1999
G409
Time: 3:25 P.M. Date: 8/2/1999


SODIUM HYPOCHLORITE (NaOCl) STORAGE AND FEED SYSTEM
SODIUM HYPOCHLORITE FEED PUMPS
SODIUM HYPOCHLORITE (NaOCl) STORAGE TANK 4213-00
SODIUM HYPOCHLORITE (NaOCl) STORAGE TANK 4214-00
SODIUM HYPOCHLORITE (NaOCl) STORAGE TANK 4215-00
FILL
VENT
OVERFLOW (TYP.)
DRAIN (TYP.)
HYPOCHLORITE FILL STATION
HYPOCHLORITE SUMP PUMPS
TO SCRUBBER 4423-00 SUCTION OF RECIRC. PUMPS
TO SCRUBBER 4424-00 SUCTION OF RECIRC. PUMPS
TO SCRUBBER 4425-00 SUCTION OF RECIRC. PUMPS
TO SCRUBBER 4426-00 SUCTION OF RECIRC. PUMPS
TO SECONDARY WET WELL
NOTE 1 (TYP.)
FLUSHING CONNECTION (TYP.)
CONTAINMENT AREA
SODIUM HYDROXIDE (NaOH) STORAGE AND FEED SYSTEM
CAUSTIC FEED PUMPS
CAUSTIC
SODIUM HYDROXIDE (NaOH) STORAGE TANK 4713-00
SODIUM HYDROXIDE (NaOH) STORAGE TANK 4714-00
FLUSHING CONNECTION
HYDROXIDE FILL STATION
HYDROXIDE SUMP PUMPS
NOTE:
1 FOR SUMP PUMP PIPING VALVE TAG NOS. SEE TABLE ON DWG. G449.
2 FOR VALVE EQUIPMENT SIZE NOT SHOWN SEE MECHANICAL DRAWINGS.
UNAUTHORIZED ALTERATIONS OR ADDITIONS TO A PLAN BEARING A LICENSED ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.
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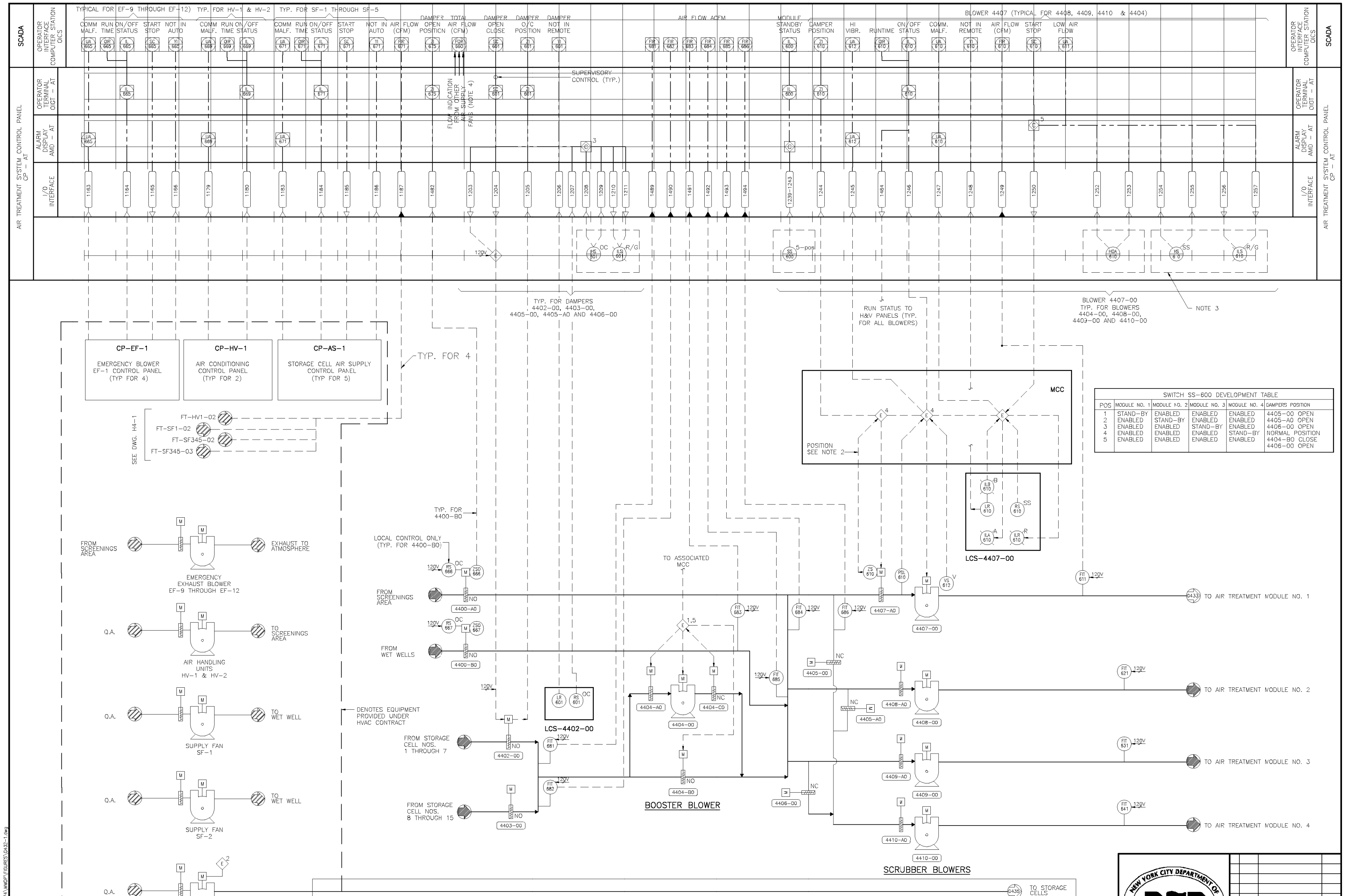
REVISIONS
FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169
FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4
PROCESS AND INSTRUMENTATION
FLOW DIAGRAM
CHEMICAL STORAGE AND FEED SYSTEMS
DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ
SCALE: NONE
DATE: MAY 1999
G410
Time: 7:22 A.M. Date: 4/25/1999 pcd@ Drawing File: H:\32174\INS\Rev8\32174_17.dwg



SWITCH SS-600 DEVELOPMENT TABLE					
POS	MODULE NO. 1	MODULE NO. 2	MODULE NO. 3	MODULE NO. 4	DAMPERS POSITION
1	STAND-BY	ENABLED	ENABLED	ENABLED	4405-00 OPEN
2	ENABLED	STAND-BY	ENABLED	ENABLED	4405-A0 OPEN
3	ENABLED	ENABLED	STAND-BY	ENABLED	4406-00 OPEN
4	ENABLED	ENABLED	ENABLED	STAND-BY	NORMAL POSITION
5	ENABLED	ENABLED	ENABLED	ENABLED	4404-B0 CLOSE 4406-00 OPEN

INTERLOCK NOTES:

1. STARTING OF EITHER OF THE TWO BLOWERS FROM THE GROUP OF SF-2 THROUGH SF-5 ENABLES THE CONTROL FOR THE BOOSTER BLOWER. SEE TABLE (THIS DWG.) FOR DAMPER POSITIONS.
2. LOGIC SHALL PERMIT STARTING OF MORE THEN ONE "STORAGE CELL SUPPLY BLOWER" IF THE FOLLOWING CONDITIONS ARE MET:
   A. AIR SUPPLY VALVES TO ALL CELLS BUT ONE ARE CLOSED – "MAINTENANCE MODE";
   B. WATER LEVEL IN THE SELECTED FOR MAINTENANCE TANK DOES NOT EXCEED EL. 3.00
   C. BOOSTER BLOWER DOES NOT REPORT MALFUNCTION.
   D. MINIMUM OF TWO SCRUBBERS ARE OPERATIONAL.
3. LOGIC SHALL PERMIT STARTING OF ANY "STORAGE CELL AIR SUPPLY BLOWER" IF MINIMUM OF SIX AIR SUPPLY VALVES ARE OPEN.
4. LOGIC SHALL OPEN INLET DAMPER WHEN ASSOCIATED BLOWER STARTS, AND CLOSE WHEN IT STOPS.
5. LOGIC SHALL OPEN DAMPERS 4404-A0 & 4404-C0, CLOSE DAMPER 4404-B0 WHEN BLOWER STARTS; REVERSE SEQUENCE WHEN BLOWER STOPS.

NOTES:

1. FOR PANEL AND LCS LAYOUT SEE DWGS. G438 & G442.
2. DAMPER LIMIT SWITCHES SHALL BE WIRED DIRECTLY TO MOTOR STARTER LOGIC. TYP. FOR DAMPERS 4404-A0, B0, & C0, 4407-A0, 4408-A0, 4409-A0 & 4410-A0. ALL DAMPERS SHALL REPORT OPEN/CLOSE POSITION TO OIGT AND SCADA SCREENS.
3. TYPE CMC ILLUMINATED SWITCH, MOMENTARY START AND PUSH TO STOP.
4. CALCULATE SUM OF AIR FLOW SUPPLIED BY SF-2, 3, 4 AND 5.

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NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION — DEP

NO.	DATE	DESCRIPTION	APPR'D.

REVISIONS

CAPITAL PROJECT NAME & NO.: FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

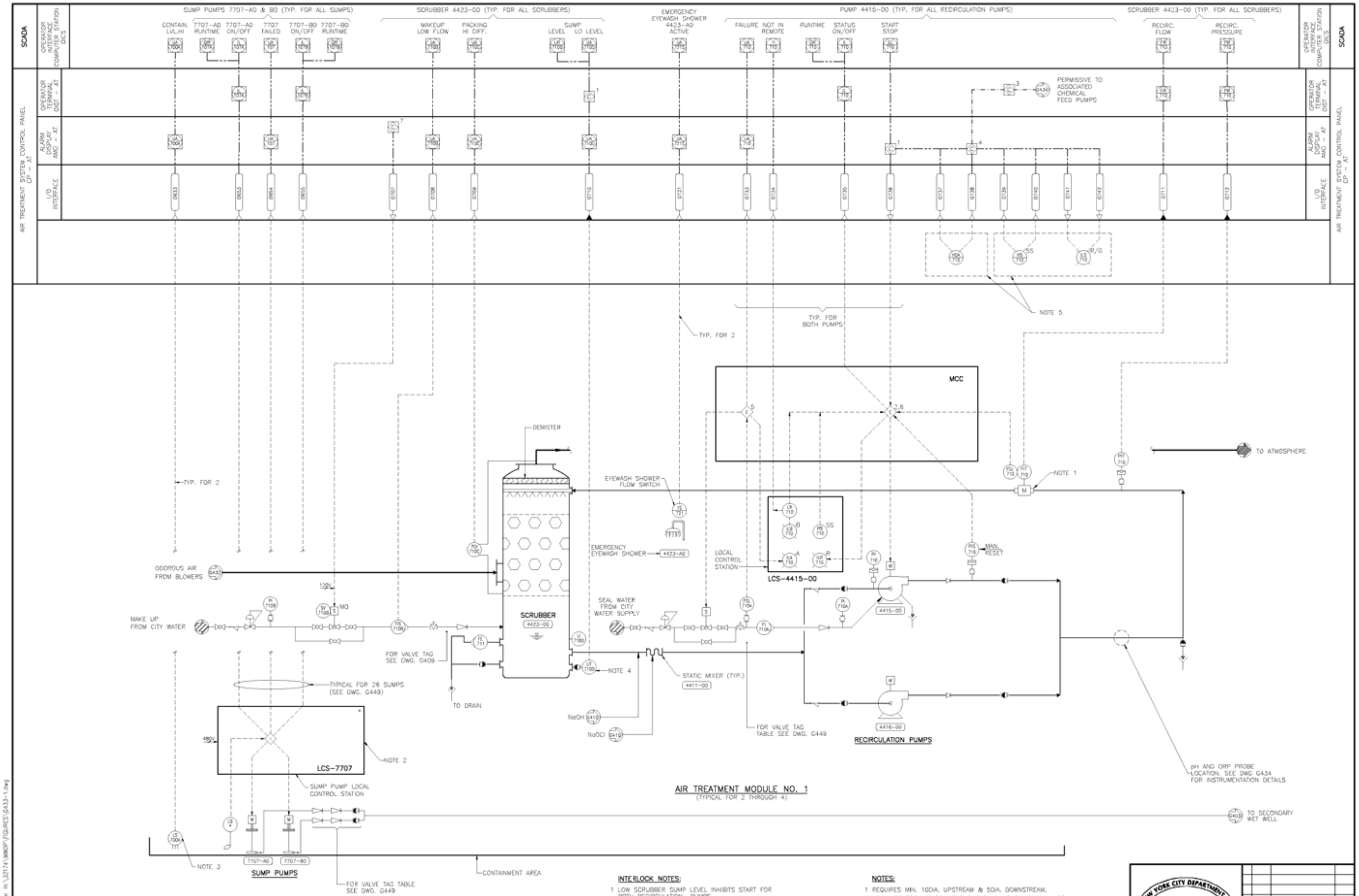
CONTRACT NAME & NO.: FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

DRAWING TITLE: PROCESS AND INSTRUMENTATION

P & ID
AIR TREATMENT SYSTEM – AIR BLOWERS

DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ
CHIEF:
PROJ MGR.:
GRAPHIC SCALE
SCALE: NONE
DATE: JULY 2004
DWG. NO.: G432-1 OF:
SHEET NO: OF:

Time: 10:53 A.M. Date: 4/4/2007 PCGRMD Drawing File: H:\32174\WMDP\FIGURES\G432-1.dwg



INTERLOCK NOTES:

1. LOW SCRUBBER SUMP LEVEL INHIBITS START FOR BOTH RECIRCULATION PUMPS.
2. PUMP SHUTS DOWN ON HIGH DISCHARGE PRESSURE; RESET REQUIRES RESTARTING THE PUMP.
3. PERMISSIVE TO CHEMICAL FEED PUMPS.
4. SCRUBBER AIR FLOW ENABLES RECIRCULATION PUMPS CONTROL. FIRST PUMP SELECTED "AUTO" POSITION ASSUMES THE "LEAD" MODE. OTHER PUMP BECOMES AUTOMATIC STANDBY. NORMAL SHUTDOWN OF THE "LEAD" PUMP SHALL NOT START STANDBY, NOR ALTER THE MODE.
5. SEAL WATER FLOW STARTS WHEN THE PUMP IS STARTED, AND STOPS WHEN THE PUMP IS STOPPED.
6. PROVIDE TIME DELAY IN START CIRCUITRY TO ALLOW FOR SEAL WATER PRESSURE TO BUILD & RECIRC. FLOW TO BE DETECTED.
7. SOLENOID OPENS WHEN EITHER RECIRCULATION PUMP STARTS.

NOTES:

1. REQUIRES MIN. 10DIA. UPSTREAM & 5DIA. DOWNSTREAM.
2. LOCAL CONTROL STATION FOR DUPLEX SUMP PUMP SHALL BE PROVIDED BY SUMP PUMP VENDOR (TYPICAL FOR 24).
3. FOR LEAK SENSOR PROBE INSTALLATION DETAIL SEE DWG. G447.
4. FOR OPEN FLANGE LEVEL TRANSMITTER INSTALLATION DETAILS SEE DWG. G447.
5. TYPE CMC ILLUMINATED SWITCH, MOMENTARY START AND PUSH TO STOP.

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION — DEP

REVISIONS

FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

PROCESS AND INSTRUMENTATION

P & ID
AIR TREATMENT SYSTEM – SCRUBBERS

DESIGNED BY:	MB
DRAWN BY:	MB
CHECKED BY:	MB
GROUP LEADER:	MZ
SCALE:	NONE
DWG. NO.:	G433-1
DATE:	MAY 1999

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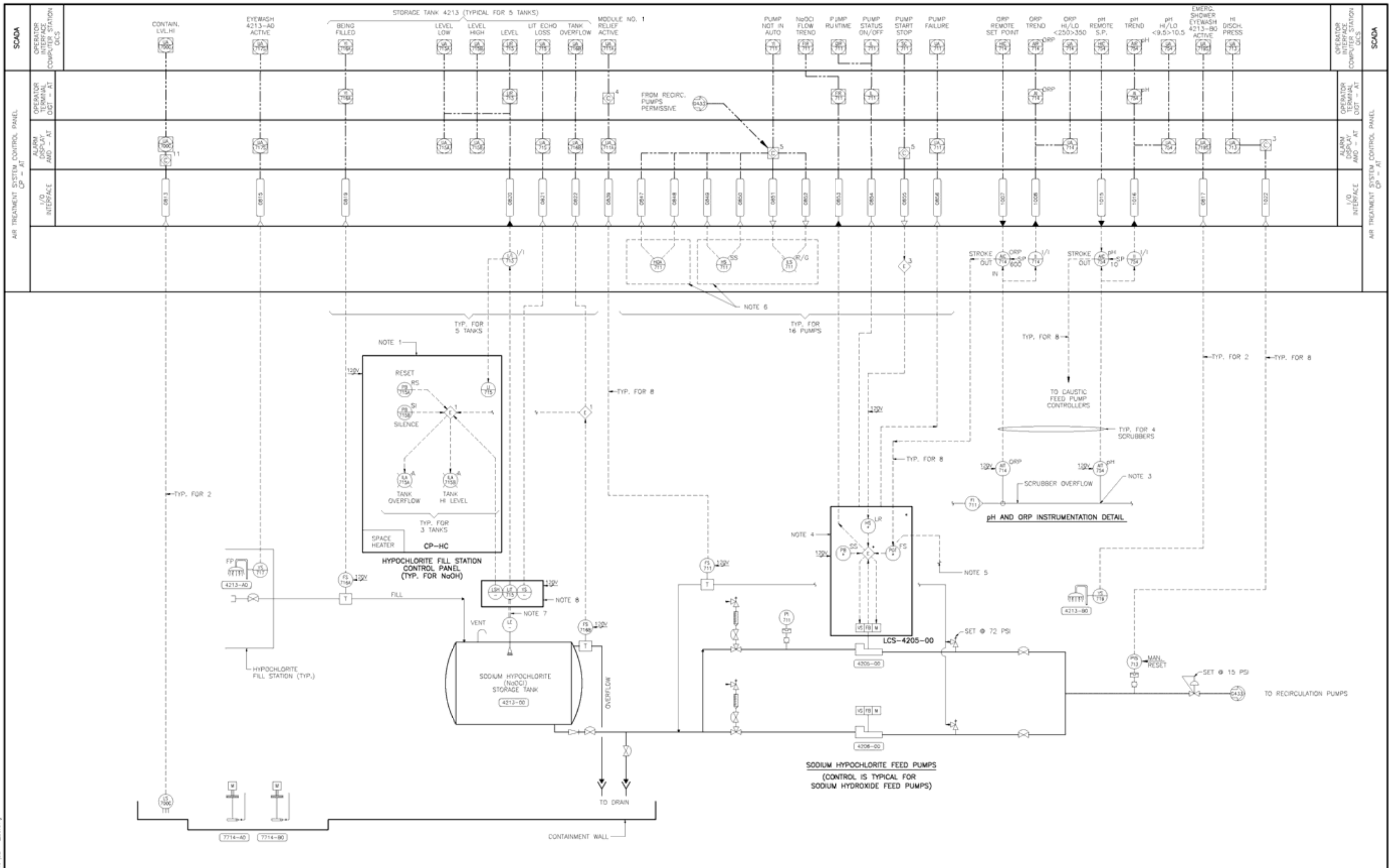
CONSULTING ENGINEERS
NEW YORK NEW JERSEY

Time: 10:43 A.M. Date: 4/4/2007 PCGRMD Drawing File: H:\32174\WMOP\FIGURES\G433-1.dwg



INTERLOCK NOTES:

1. HIGH TANK LEVEL, OR TANK OVERFLOW INITIATES ALARM.
2. LOW TANK LEVEL IN ALL THREE TANKS SHALL INHIBIT START OF EVERY SODIUM HYPOCHLORITE FEED PUMP.
3. PUMP SHUTS DOWN ON HIGH DISCHARGE PRESSURE; RESET REQUIRES RESTARTING THE PUMP.
4. PUMP SHUTS DOWN ON RELIEF DETECTION; RESET REQUIRES TO RESTARTING THE PUMP.
5. PUMP CONTROLS ENABLE ONLY WHEN ONE OF THE ASSOCIATED RECIRCULATION PUMPS IS ON. FIRST PUMP PLACED IN "AUTO", ASSUMES "LEAD" MODE. OTHER PUMP BECOMES AUTOMATIC STANDBY. NORMAL SHUTDOWN OF "LEAD" PUMP SHALL NOT START STANDBY, NOR ALTER THE MODE.

NOTES:

1. FOR PANEL LAYOUT AND ELEMENTARY DIAGRAM SEE DWGS. G436 & G437.
2. NOT USED
3. FOR PROBE INSTALLATION DETAIL SEE DWG. G447
4. PUMP CONTROLLER SHALL BE PROVIDED BY THE PUMP VENDOR, AND SHALL PERFORM FUNCTIONS AS SPECIFIED IN SECTION D-3.4
5. SIGNAL SHALL DAISY CHAIN THROUGH PUMP 4205-00 AND 4206-00 STROKE CONTROLLERS (SHARED OUTPUT).
6. TYPE CMC ILLUMINATED SWITCH, MOMENTARY START AND PUSH TO STOP.
7. TRANSDUCER CABLE SHALL BE PROVIDED BY LEVEL TRANSMITTER MANUFACTURER.
8. FOR LEVEL TRANSMITTER ENCLOSURE LAYOUT SEE DWG. G436
9. "*" - EQUIPMENT PROVIDED AS PART OF ASSOCIATED EQUIPMENT.
10. SODIUM HYPOCHLORITE FEED PUMPING IS SHOWN AND IS TYPICAL FOR CAUSTIC FEED PUMPING.
11. INHIBIT AUTOMATIC OPERATION OF SUMP PUMPS IF LEAK DETECTOR IS ACTIVE.

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NEW YORK NEW JERSEY

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

NO.	DATE	DESCRIPTION	APPR'D.

REVISIONS

CAPITAL PROJECT NAME & NO.: FLUSHING BAY WATER QUALITY IMPROVEMENT PROJECT WP-169

CONTRACT NAME & NO.: FLUSHING BAY CSO RETENTION FACILITY STORAGE FACILITY CONTRACT NO. CS4-4

DRAWING TITLE: PROCESS AND INSTRUMENTATION

P & ID
AIR TREATMENT CHEMICAL SYSTEM

DESIGNED BY: MB
DRAWN BY: MB
CHECKED BY: MB
GROUP LEADER: MZ
SCALE: NONE
DATE: MAY 1999
DWG. NO.: G434

Time: 3:24 P.M. Date: 8/2/1999 pomeb Drawing File: H:\32174\INS\Rev6\32174_20.dwg